

October 21–24, 2021

Wounds Canada
2021 Virtual Conference:

Connect, Collaborate, Co-create



Reporter: Katie Bassett, BMus

Session Summaries

Wounds Canada held its fall 2021 conference as a virtual event October 21 to 24. The session summaries that follow include highlights and practice pearls from selected sessions.

CLOSING THE GAP ON PI: WHERE ARE WE NOW AND WHERE ARE WE GOING?

*Session Speakers: Elizabeth A. Ayello, PhD, RN;
Alan Rogers, FC Plast Surg, FACS, MSc; Vera Santos, PhD RN*

Epidemiology of PIs

Vera Santos began by presenting the overall epidemiology and burden/impact of PIs on health-care systems. Pressure injuries (PIs) are potentially preventable adverse events that act as important quality indicators of patient safety and the performance of the health system. According to a Brazilian National Report on Patient Safety Policy (2014–

2017), PIs are the third most frequent adverse event experienced by patients (17% of 134,501 incidents; 73% stage 3 and 22% stage 4; 34 deaths).

In a 2020 systematic review of 39 studies (2008–2018; 2.5 million patients), an overall PI prevalence rate of 13% and a hospital-acquired rate of 8.4% were reported among acute care patients. In a 2018 systematic review (2000–2015, 19 studies), depending on the methodology used, a worldwide PI rate of 6 to 18.5% was reported among acute care patients.

In a 2018 systematic review of 22 studies (2002–2017), a prevalence rate of 17 to 24% was reported



among intensive care unit (ICU) patients, with a cumulative incidence rate of 10 to 26%. A systematic review of 28 studies conducted between 2010 and 2016 identified 43 risk factors for PI development in ICU patients that were sorted into six broad categories (e.g., demographics, comorbidities, severity of illness). It is important to remember the contribution of medical device-related PIs in this patient population.

A 2018 multicentre study of 60 long-term care facilities (6,556 patients) in Australia found a rate of 1.3 PI per 1000 residents per day, with 10% of facilities demonstrating persistently high rates of PIs, especially in areas of low socioeconomic status.

In palliative care, a 2017 systematic review of 12 studies (63,907 patients) found a PI incidence of 11% and a prevalence of 12%. Critical risk factors in this population included mobility, age, Waterlow scale scores and length of stay.

A 2020 systematic review of 29 studies (82,722 patients) found that more than one in five patients with a spinal cord injury (SCI) will develop a PI (global incidence 0.23).

Impact of PIs on Health-care Systems

Santos went on to explain that PIs present a massive economic burden on health-care systems. In the U.S., stage 3 and 4 PIs are estimated to cost \$26.8 billion; each hospital-acquired PI is estimated to cost \$21,767. In Ontario (2013), among the community-dwelling SCI population, one month of PI care costs about \$4,700.

Prevention is cost effective for all patients. In a 2019 systematic review (2001–2013, 17 studies), PI prevention was found to cost between € 2.65 and €87.57 per day (across all settings), whereas PI treatment was found to cost between € 1.71 and €470.49 per day (and significantly more for advanced stage PIs).

Should punitive measures be imposed on institutions? If so, which ones are effective?

Elizabeth Ayello described the way decisions in the U.S. are made based on money. When the payment system was changed to a diagnostic-related system and emphasis on HAPI from CMS, hospitals saw a reduction in the amount of money they received if someone acquired a PI during their hospital stay. If there was appropriate documentation of a PI on admission, the hospital would receive appropriate amounts of money. She discussed the difference between motivating people with a financial penalty or with a quality prevention incentive. Unfortunately there is no clear answer on which approach is more effective—the “carrot” or the “stick.”

How accurate are data outside of well-developed centres?

According to Alan Rogers, data are only as good as the systems that allow for its collection. Data collection is often only possible once systems are in place to actually care for the patients—if care is not optimal, data collection is not a priority. This raises questions about the accuracy of data collected worldwide, especially in less developed centres.

How accurate are data on pediatric and long-term care populations?

Ayello explained that most PIs in pediatric populations are related to medical devices. In long-term care, PIs are being seen in less common places on the body. For example, during COVID-19, some LTC residents developed PIs on their ears as the result of wearing masks. Staff were not accustomed to checking ears for these injuries. Similarly, prone positioning due to COVID added to PI development rates in LTC (in one case, a patient’s tooth punctured the lip). Ayello also discussed the ways data collection

can be made challenging by multiple risk factors being present. For example, some patients with diabetes acquire wounds on their feet that are primarily caused by pressure. In these cases, it is not always clear how the wound should be classified.

What is the most challenging barrier to managing PIs?

Santos discussed the ways overloaded systems cause shortages of human resources. This can significantly contribute to PI numbers, especially among SCI patients and during exceptional circumstances like COVID-19.

Should assessment tools be commercialized?

In Canada, the Braden Scale is being commercialized. According to Ayello, since its development in the 1980s, Barbara Braden and Nancy Bergstrom owned the copyright to the Braden Scale and required those using the scale to pay a fee. In April 2021, the developers sold the scale to HD Nursing, who now own the copyright and have the right to charge a fee for its use. It is not new that money was due to use the scale.

The purpose of an assessment tool is to help people think about the factors that may put people at risk for developing a wound. Sometimes these risk assessment scales become just another task and are quickly filled out. As a result, they may not be accurate or lead carers to consider the patient holistically.

Are we expecting there to be magical new strategies to prevent or treat pressure injuries?

According to Rogers, this is unlikely. That being said, integrated care and knowledgeable and confident care staff are likely to lessen the numbers and severity of PIs.

Are all PIs treatable? Are terminal ulcers something we should accept?

Rogers reminded delegates that it is important to consider that further interventions might be contrary to the patient's wishes at end of life. Ayello explained that in the U.S., "unavoidable

pressure injuries" are declared when an individual has developed a pressure injury even though the facility or provider has evaluated the individual's clinical condition and PI risk factors; defined and implemented interventions that are consistent with the individual's needs, goals and recognized standards of practice; monitored and evaluated the impact of interventions and revised the approaches as appropriate. The problem is this is a diagnosis made in retrospect; there is no way to make this diagnosis prospectively. In a 2019 paper, 87% (226) of survey respondents agreed that terminal ulcers at the end of life are unavoidable and not attributable to substandard care.

THE ROLE OF MENTAL HEALTH IN MANAGING WOUNDS

*Session Speakers: Noha George, RP MSW RSW;
Stacey Coomber Stevens, JD*

Noha George began the session by stating the mind-body connection is well established and backed by scientific research and anecdotally. Neural pathways, made of neurotransmitters, hormones and chemicals, impact our overall functioning. The link between physical and mental health is inseparable. The link goes both ways: just as our mind impacts our physical health, our physical health impacts our mental health. Depression, anxiety and stress influence our immune function, hormones and organ function.

Simple Strategies, Powerful Results!

- Provide direct and concrete information
- Cultivate "realistic hope" & positivity
- Promote a BIG PICTURE approach / logos
- Discuss and reinforce principle of self determination
- Invite and inspire self reflection /Mindfulness
- Facilitate affect recognition
- Look for support networks (formal and informal)
- Encourage self compassion

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Wounds can affect all aspects of a patient's life, including independence for activities of daily living, family life, interpersonal relationships and intimacy, social/leisure time, and vocational and financial status. It is critical to remember that autonomy is a major psychological need.

Family Life

Our mental health is linked to our routines, roles and responsibilities in different settings. Being unable to contribute to these can have a profound impact on mood, self-image, self-esteem and more. Changes also often come with a change in interpersonal and power dynamics. Fatigue, pain, stress, self-image, self-esteem, mood and physical changes caused by wounds can contribute to decreased desire for physical and emotional intimacy. This can also affect the partner without a wound, especially in terms of fatigue if they become a caregiver.

Social Life

Social isolation, loneliness and withdrawal can affect individuals living with wounds. These issues can be caused by actual or perceived barriers. Actual barriers include comorbidities, pain, fatigue and the presence of physical challenges. Patients may be affected by perceived barriers such as low self-esteem, changed body image or feeling they have little to contribute, all potentially leading to withdrawal.

Vocational and Financial Status

Chronic wounds have a significant impact on a person's ability to work and generate income, often leading to financial insecurity.

These factors can become cyclical, resulting in increased stress, anxiety, grief/depression, self-esteem issues, body image issues, loneliness/social isolation and more financial insecurity. A person's sense of meaning and purpose in life comes from their experience of whether their life adheres to the vision of how they see themselves and thought their lives would play out. Those with chronic wounds can feel a disconnect or tension between who they are and who they expected to be or are expected to be. This can be extremely intrusive to the healing process.

Key Principles to Keep in Mind

1. Power dynamics are critical. Patients receiving medical services can feel intimidated and overwhelmed. Depending on others for care requires a huge amount of trust. Remind patients that they are the most powerful agents of change and set goals with the patient based on their needs and desires.
2. Remember the boundaries of a person's body and space. Ask permission before touching or beginning procedures and always be as respectful as possible. If entering the home, ask permission before sitting down or using objects.
3. Countertransference. Be self-aware if someone is triggering feelings associated with someone you have known in the past and remind yourself not to respond based on preconceived notions or habits.
4. Use silence, pauses and sentence fragments to allow patients time to speak and to be heard.
5. Mine for emotion beyond the surface. Don't take behaviours at face value but look for the emotion behind the behaviour.
6. Provide patients with reliable information. Anxiety can be caused by a lack of knowledge and feeling a loss of self-determination.
7. Cultivate realistic hope.
8. Promote the big picture. See patients as more than the sum of their physical or emotional limitations. Take a moment to ask about things that are important to them; don't limit conversation to the wound.
9. Reinforce the principle of self-determination. Patients are the experts on their own health and do have control over their care and health.
10. Invite and inspire self-reflection and mindfulness. Mindfulness has been shown to be powerful in the healing process for physical or mental unwellness.
11. Facilitate affect recognition. Help patients name their emotions and recognize what they are truly feeling and why.
12. Look for formal and informal support networks for patients.
13. Encourage self-compassion. Treat patients with genuine compassion and non-judgement to model that behaviour. Self-compassion can

increase motivation, self-esteem and body image, and improve quality of life.

14. Avoid minimization and catastrophizing. These can be shown verbally or in tone of voice and body language. Try to avoid saying things like, “I know what you’re going through” or “Oh no! Your wound looks awful!”
15. Validate, validate, validate! While you don’t have to validate an action if it is contributing to the wound, it is important to validate the emotion behind it.

Stacey Coomber Stevens continued the presentation by discussing burnout—which can manifest in a number of ways, including fatigue, sadness, disinterest, anger and withdrawal—and countering it with a strong physical and mental foundation. Her vision of health requires appropriate and adequate nutrition based on fresh, not processed, foods; regular exercise; adequate high-quality sleep; stress management and social relationships.

THE CONTINUUM OF CARE: IMPROVING TRANSITIONS OF PATIENTS WITH WOUNDS

*Session Speakers: Irmajean Bajnok, RN MScN PhD;
Elizabeth Parfitt, Infectious Diseases MD*

Irmajean Bajnok began the session by emphasizing that transitions for patients with wounds—either from pediatric to adult services or from one health-care setting/sector to another—are critical to achieving management or healing goals.

While we often think of care transitions as transition of the patient, they can more accurately be defined as transfers of responsibility and accountability for some or all aspects of patient care related to providers, institutions and/or sectors. These transitions occur across the lifecycle (child to youth, youth to adult, adult to older adult) and when there are changes in health status or care that result in changes in treatment goals, service providers or the location of services.

Each time patients move from one setting of care to another, there is a risk to their health because of



the potential for miscommunication between care providers. When gaps in care transitions occur, individuals are susceptible to fragmented care, delayed care, poor quality care, unfavourable experiences, compromised safety and/or adverse medical events. Therefore, when patients experience a change in care setting, a set of actions designed to ensure the safe and effective co-ordination and continuity of care becomes critical to wound prevention and management.

10 Concepts to Consider in Care Transitions

- Confidentiality and privacy
- Interprofessional collaboration
- Leadership
- System integration
- Continuous quality improvement
- Patient-centred care
- Therapeutic relationships
- Effective communication
- Informed decision making (including the patient!)
- Ethical principles

A Case Study

Elizabeth Parfitt continued the presentation with a case study illustrating the concepts of care transitions. The case featured a patient from Kamloops, BC, with severe venous stasis wounds who experienced several care transitions over a six-year period from 2015 to 2021. This included 29 emergency room visits with 13 resulting hospitalizations, as well as intermittent home care provided by various home care services and later by his wife.

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In 2015, Parfitt met the 68-year-old male with diabetes with elevated A1c, coronary artery disease (CAD), atrial fibrillation (AF), high body mass index (BMI), venous stasis and recurrent cellulitis. He used a motorized scooter following a complicated coronary artery bypass graft 15 years prior. He had a history of pressure injuries related to cardiac surgery complications, but these had healed. In 2015 he had a small venous ulcer; compression and outpatient wound care were recommended. The wound healed, but he experienced progressive venous stasis changes.

In 2016, he sustained a collision with a vehicle while using his scooter and developed a large laceration to his left lower leg. This evolved into skin necrosis that was debrided by a plastic surgeon and healed within a few months.

In 2017, the patient presented with sepsis, and Group B *Streptococcus* were found in his blood cultures. He also had lymphangitic changes on his right leg. He was seen by a vascular surgeon, and the arterial investigations were reassuring. At this point

he was using Velcro compression devices at home, although there was some concern about adherence and it was noted that he slept in a recliner.

In 2019, he presented with cellulitis in his right leg and lymphatic change. Around this time he experienced multiple hospitalizations due to lower gastrointestinal bleeding, chronic obstructive pulmonary disease exacerbation and pneumonia. Later that year, he had multiple ER visits due to cellulitis of the right lower leg that was complicating now-chronic wounds. To prevent more ER visits, the team moved to a pre-emptive approach with antibiotics. Challenges with home care included difficulty donning and doffing compression, low adherence and difficulty for his wife as primary caregiver due to significant arthritis in her fingers and full-time employment. As confidence in the treatment plan was lost, little healing occurred. In October 2019, he was hospitalized with an infected wound on his left leg. Significant healing was achieved during an inpatient stay.

In 2020, preventative penicillin was started due to the frequency of skin and soft tissue infections and ER visits. Within a month of this new regimen, he was in the ER twice. At this time he was applying petroleum jelly to wounds, had a deteriorating relationship with outpatient care and was often not at home when home visits were scheduled to occur.

In 2021, the patient was discharged from the outpatient wound care program as adherence to the prescribed care plan had been poor. A meeting was scheduled with the multidisciplinary team and patient to discuss next steps as frustration among the patient and health-care team grew. In June, he had additional ER presentation but for non-infectious, non-wound-related issues, including hyperkalemia, chest pain and hyperglycemia. The team decided to adopt a palliative paradigm for wound management. Malodour was especially problematic at home, so topical metronidazole was tried. The patient's relationship with his wife was also becoming strained. In September, the patient was admitted to hospital with COVID-19 and ultimately palliated when respiratory failure developed.

Parfitt ended the case presentation by asking delegates to think about the concepts Bajnok introduced related to care transitions and to consider how they were demonstrated in the case. Were they facilitators, barriers or both? She recapped both the physical transitions experienced by the patient and the transition of goals of care during treatment. Bajnok reminded delegates that there was fairly sustained improvement for five of the six years of the patient's care, noting that it is important to discuss positive and negative factors in the overall case.

In the discussion, Parfitt described several lifestyle factors she learned about only during her debrief with the patient's wife following his passing and explained she felt even more sympathetic about his situation and goals with this added understanding than when they were treating him. This underscores the importance of holistic care and understanding the emotions behind a patient's actions.

One delegate raised the point that the patient had been living with poorly managed comorbidities for years and that maybe it is unrealistic to expect this type of patient to be motivated and engage in complex self-care for wounds, especially approach-

ing end of life. Perhaps involving a social worker or someone trained in motivational interviewing could have shed light on the patient's underlying motivations. Another delegate suggested that patient burnout might have been a factor in this case with multiple complex comorbidities.

Upon reflection, a consistent team of caregivers would likely have enhanced transitions. More direct communication between community care and outpatient care could have also aided with the frequent transitions. It is critical to strive for a full understanding of the patient as a person and the meaning behind their behaviours. In this case, the multidisciplinary care team meeting with the patient and his family was very valuable; this should have been done at the start of care and periodically throughout care.

Successful Transitions

Bajnok continued her presentation by describing requirements for successful care transitions, which include:

- Multidisciplinary communication and co-ordination
- Comprehensive planning, including patient and care partner education and health-care provider involvement
- Shared accountability during all points of transition

She then shared several strategies to help with care transitions, including communication between members of the care team; standardization of processes and policies; leveraging technology; considering environmental strategies; providing training and education for health-care providers, patients and care partners; and encouraging staff involvement in the transition process.

Health Quality Ontario's 10 standards of care transition, which are informed by direct patient input, are:

- Information sharing on admission
- Comprehensive assessment
- Patient, family and caregiver involvement in transition
- Patient, family and caregiver education, training and support

- Transition plans
- Co-ordinated transitions
- Medication review and support
- Co-ordinated follow-up medical care
- Appropriate and timely support for home and community care

Bajnok acknowledged the value of the Registered Nurses' Association of Ontario's evidence-based **Best Practice Guideline Care Transitions** in understanding approaches to successful transitions in care.

THE FUTURE OF WOUND PREVENTION AND CARE: GENE THERAPY, DERMAL SUBSTITUTES, PLATELET-RICH PLASMA, 3D PRINTING

Session Speakers: Paul F. Gratzner, BASc MASc PhD PEng; Marc Jeschke, MD PhD FACS FCCM FRCS(C)

Dermal Substitutes

Dermal substitutes act as temporary 3D scaffold that provides physical and biochemical cues to cells that drive and support the regeneration of new tissue. Paul Gratzner explained that these substitutes work by utilizing extracellular matrix (ECM) components that mimic the dermis structure. This can include growth factors and ECM components that stimulate and drive cells, including macrophages, fibroblasts, T_h cells, stem cells, vascular cells and epithelial cells to move through

the wound healing process.

Dermal substitutes can “break” chronic inflammatory cycles seen with some hard-to-heal wounds and push toward tissue regeneration, stabilizing the wound environment and encouraging the formation of neo-dermis. Dermal substitutes are an adjunct to the standard of care, which involves debridement, offloading and the use of wound dressings. Wound dressings create and maintain the environment for wound healing, but the dermal substitutes get actively involved in helping cells in the surrounding tissue promote a more regenerative response.

Dermal substitutes can be divided into five categories:

1. Human acellular dermal matrix (ADM) – decellularized human tissues
2. Cultured human cell constructs – combination of live human cells and non-living matrix
3. Reproductive tissues – amnion/chorion
4. Animal-derived matrices – Reconstructed or taken from animals, including pigs, cows, fetal cows and fish
5. Allograft skin – intact donated skin

Human Acellular Dermal Matrix (ADM)

ADM is derived from donated human split-thickness skin grafts and processed using chemicals, surfactants and other means to remove the cellular materials of the donor (sources of immunogens that may result in donor rejection). The remaining non-living, porous dermal “scaffold” (ECM) stimulates wound healing and regeneration. Some products are “ready to use,” while others are dehydrated to make storage easier. A large number of these products are currently available and are regulated under Cells, Tissues and Organs (CTO) regulations by Health Canada and under human cell and tissue-based products (HCT/Ps) by the Food and Drug Administration (FDA) in the U.S.

Cultured Human Cell Constructs

Cultured human cell constructs are made from dermal and/or epidermal cells harvested from human neonatal skin combined with non-living matrix (PGA, bovine collagen). These cells pro-

Cultured Human Cell Constructs

Human neonatal (foreskin) cells (dermal and/or epidermal) combined with matrix (PGA, Bovine collagen)

Original idea: cells increase healing by staying in matrix and are accepted by host

Current evidence: cells produce growth factor and cytokines, die off soon after implantation

Most expensive dermal substitutes

Delivered frozen or “live” with short shelf life

Regulated with Pre-Market Approval by FDA

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OCTOBER 21-23, 2011

Apligraf compared to human skin under a microscope

Stratum corneum
Epidermal keratinocytes
Dermal fibroblasts
Organized extracellular matrix

Apligraf Human skin

duce growth factors and cytokines that stimulate the patient's cells to accelerate wound healing, and then die soon after implantation. These products are the most expensive of the dermal substitute categories. They are delivered frozen or "live," with a short shelf life (~10 days). They are regulated with Premarket Approval by the FDA.

Reproductive Tissues

A more recent type of dermal substitute is reproductive tissue products, which are derived from the innermost lining of placenta (including one or both of the amnion and chorion layers). This tissue has an immune-privileged state, growth factors and anti-inflammatory properties. Commercial preparations of these products include cryopreserved, dehydrated or sterilized. These products are regulated under HCT/Ps of the FDA.

Animal-derived Matrices

Animal-derived matrices are made from repurposed purified collagen, glycosaminoglycans (GAGs) or tissues from animal sources such as pigs, cows or fish. The purified collagen/GAGs can be formed into porous matrices and may be stored in a dehydrated form. Due to the use of animal tissues, even if the cells are removed, these products may cause issues with immune response (e.g., reaction to alpha-gal). There is also some scientific evidence that human cells react differently when put within or onto animal cells versus human-derived matrices. These products are regulated by the FDA under 510(k) Premarket Approval.

Burn Injuries

Marc Jeschke continued the session by emphasizing the importance of closing burn injuries. Autologous split-thickness skin grafts are one option for covering burn wounds. This approach requires donors and increases wound size and pain.

Cultured Epithelial Autograft (CAE)

This was the first step in tissue engineering. Using this technology, a tissue biopsy is taken and keratinocytes are cultured into an epidermal sheet used to close large burn injuries. This technology is currently viewed with some skepticism because

the cost of treatment is high and length of hospital stay is not shortened.

Collagen-elastin Dermal Matrix

Collagen-elastin dermal matrices are three-dimensional bovine collagen and elastin matrices. These extracellular matrix proteins serve as a scaffold for reconstitution of the skin and the modulation of scar tissue. These matrices result in good cosmetic outcomes when used for acute wounds, burns, trauma and burn reconstructions. Adding stem cells to these non-living matrices has been seen to enhance healing.

Bilayer Wound Matrix

Bilayer wound matrices include dermal and epidermal analogs. The dermal analogue is made of a biodegradable collagen-GAG co-polymer matrix. The epidermal analogue is a thin silicon elastomer. In this layer, bovine collagen and shark chondroitin-6-sulphate are cross linked to maximize growth of cells and control the rate of matrix degradation. After neodermis formation (~2–3 weeks), the epidermal analogue (silicon) is removed and replaced with thin epidermal autograft or cultured epithelial cells. Major causes of loss of dermal analogue include infections and shearing with devascularization. Current engineering is exploring seeding of the dermal analogue with epidermal cells that could then produce epidermis (a one-step skin replacement process).

Stem Cell Therapies

To date, no stem cell technologies have been clinically introduced as a standard. Anecdotally, Jeschke had great success with stem cell treatment for a patient who had almost 90% burn coverage and had been in hospital without healing for two years. Upon admission to Jeschke's unit, stem cell treatment was attempted and the patient was out of the hospital within three months. One current challenge is the inability to perfectly mimic natural human skin with this technology.

Human Fibroblast-derived Temporary Skin Substitute

Human fibroblast-derived temporary skin substitutes

Lower Leg Ulcers

Leg ulcers account for 80% of all cases of ulcerations worldwide. The cost of wound care for leg ulcers in Canada, is estimated to be more than \$100 million per year. Based on an analysis conducted in Ontario, cost-savings of \$6,200 per patient can be realized if the geko™ device is used as a first-line adjunctive therapy for Venous Leg Ulcers.



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are based on neonatal foreskin fibroblasts cultured into a nylon mesh. This mesh is then coated with porcine dermal collagen that is bonded to a silicon membrane epidermal analogue. The fibroblasts secrete collagen, matrix proteins and growth factors. With these products, tissue matrices and bound growth factors are left intact. Human fibroblast-derived temporary skin substitutes are indicated for partial-thickness burns or donor sites, or for temporary coverage of excised full-thickness burns.

Skin Printing

Skin printing allows the in-flow formation of a continuous, cell-populated sheet with the characteristics of human skin using progenitor cells. Various cell types can be printed, including fibroblasts and cardiomyocytes. *In vivo*, during a study of mice, printed skin improved excisional skin healing and led to complete keratinization in comparison with the control group; however, this technology failed when it was tested on a pig. This led to the development of a hand-held bio-printer.

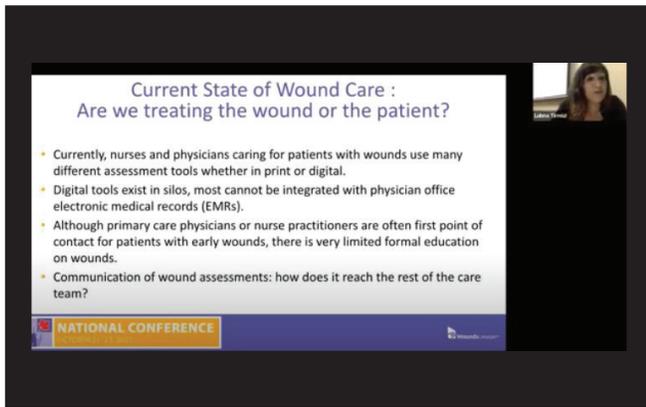
Hand-held Bio Printing

This device is lightweight, flexible and intraoperatively usable. It can address heterogeneous topography (e.g., fragile, wet, large, angled wounds) and enables equal, precise, homogenous depositing. Using this printer, an entire body's worth of skin that mimics patient cells and structure can be printed in about one hour. When tested on pigs, it had a remarkable efficacy. Researchers are currently seeking clinical approval for this device.

IMPROVING EQUITABLE ACCESS TO QUALITY WOUND PREVENTION AND CARE IN CANADA: A CASE-BASED APPROACH

*Session Speakers: Catherine Phillips, PhD;
Lubna Tirmizi, MD*

According to Michael Marmot, professor of epidemiology and public health at University College



London (UCL) and director of The UCL Institute of Health Equity, “Health inequalities and the social determinants of health are not a footnote to the determinants of health. They are the main issue.” To begin the session, Catherine Phillips encouraged delegates to consider the impact of factors like mobility limitations, food insecurity, exposure to violence, precarious housing, wound stigma and traditional knowledge/ritualistic practices on health status and wound healing.

Bryant & Raphael (2020) define social determinants of health as the conditions in which people are born, grow, live, work and age. These include socioeconomic status, housing, education, literacy, physical environment (neighbourhood and home), social support, religion, networks and social capital, employment, obesity status, race, gender, sexuality and health status. It is critical for health-care providers to recognize the context and conditions in which patients are living and the impact these have on healing.

The global need to recognize the legitimacy of wound healing as a clinical specialization and the development of funded collaborative, multidisciplinary teams are critical to equity in wound care. Another important structural factor is support for development of centres of excellence that provide optimal, individualized care as well as standards and education.

Backpack services have been shown to be quite effective for those with poor social capital or with several social determinants impeding their care. These wound care services can refer either to a carer who carries services from patient to patient,

or to packs of supplies and resources that are left in shelters, co-operative housing facilities and other underserved locations for access by staff or residents.

Wound Care Equity

Lubna Tirmizi continued by discussing the current state of wound care equity. Although primary care physicians or nurse practitioners are often the first point of contact for patients with early wounds, there is very limited formal education on wounds. Nurses and physicians caring for patients with wounds may use different assessment tools. These tools often exist in silos, and most cannot be integrated with physician office electronic medical records (EMRs) and are not always communicated to the rest of the care team, especially those providing community care or home care. She emphasized that non-compliance should act as a trigger for an in-depth examination of a patient’s social determinants of health and intervention by allied health providers like social workers. Unfortunately, as we lived through the pandemic, many gaps in care delivery were identified and deepened.

Case Studies

Tirmizi presented a number of case studies that demonstrated gaps in health equity for both patients and care providers.

Jared is a 49-year-old man with no fixed address for the past three years. He is a person who injects drugs and a frequent presenter at the local emergency department. In this instance, the outreach health hub team found him sitting in pain on a park bench. The team found a 3 cm open wound at a needle entry site on his mid left arm with thick yellow discharge and a foul odour. Although he had a fever, he refused to go to the hospital. A virtual visit with a physician was initiated, but Jared threatened to leave if he had to wait.

In Jared’s case, patient barriers included food insecurity, unstable housing and hygiene, lack of regular medical care, poor social supports and unknown medical history. Physician and system barriers included lack of training and programs for point-of-care clinicians caring for high-needs patient

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populations, little incentive for clinicians to engage in this work, lack of safe and dignified examination spaces for patients seen outside of a physical clinic, and poor technology for virtual wound visits.

Abdul is a 76-year-old man with diabetes, in Canada with refugee status. He has an Interim Federal Health plan (IFH), lives in a men's shelter and has no family or friends in Toronto. For six weeks, he had had an untreated, 6 cm-long ulcer on his inner ankle. A shelter support worker brought Abdul to a walk-in clinic for dressing changes, and in the second week Abdul went to a different clinic. He had no regular family doctor, no referral to home care and no recent bloodwork. His mobility was poor, and access to home care at his shelter was a challenge.

In Abdul's case, patient barriers included poor literacy of the health system (new to Canada), lack of regular diabetes follow-up, lack of community or caregiver supports, lack of a stable home and

poor access to home care in a shelter. Physician and system barriers included shortage of primary care in Abdul's area, walk-in doctors and new graduates who are uncertain about wound treatment, and limited home care reach in shelters.

Betty is an 80-year-old woman living at home who had had recent hip surgery, is obese and is in the early stages of dementia. She noticed a deep pain on her tailbone and buttocks. At the time of this case, Betty's hip surgery was two weeks prior and she was having physiotherapy three times per week. Betty's daughter gives her rides to the surgeon and family doctor but is always in a rush. During a post-operative visit, Betty forgot to tell her surgeon that her wound is oozing and her tailbone is sore. Betty's physiotherapist sends a handwritten note to Betty's family doctor that she noticed slight discharge from a surgical wound and a small ulcer on her coccyx. No measurement or description of either wound was given.

In Betty's case, patient barriers included mild memory changes, limited family supports, shame related to weight, and poor mobility. Physician and system barriers include inability to get an appointment with a family doctor, a difficult-to-navigate home care referral process and lack of connectivity between providers, leading to delayed assessment and treatment.

Summary of Barriers for Equity in Wound Care

- Challenges of converting standardized print assessment tools for wounds to digital formats
- Sector health-care partners using siloed approaches
- Poor access to resources for remote and high-needs populations
- Lack of formal wound education of graduating physicians

How do we achieve equitable wound care?

- Using an integrative care approach (one patient, one care plan)
- Implementing patient neighbourhoods (delivering all services close to home)
- Developing and implementing a standard wound care "language"
- Developing and implementing digital solutions for wound care that are supported by research and available to all point-of-care clinicians
- Integrating digital wound care tools into EMRs and community collaborative platforms

PRACTICAL SOLUTIONS TO MALNUTRITION IN WOUND PREVENTION AND CARE

Session Speaker: Maria Weatherbee, RD

Malnutrition is defined as the insufficient intake of calories, protein and/or other nutrients over a period of time resulting in loss of fat and/or muscle stores. It can also occur with an excess of nutrients. Malnutrition has many faces and both over- and under-nutrition can result in muscle loss and func-



tional decline. Overnutrition is sometimes overlooked; these patients require better quality calories. Sarcopenic obesity refers to both muscle loss and obesity happening at the same time, which is often caused by excessive intake of poor-quality calories. Cachexia is malnutrition related to an underlying disease.

Approximately 45% of adults admitted to Canadian hospitals are malnourished. These patients stay an average of three days longer in hospital than those who are not malnourished. Malnutrition costs the Canadian health-care system an estimated \$2 billion each year. Additionally, one in three seniors in Canada struggles to meet their nutritional needs.

Malnutrition has many causes. For example, poor appetite, hospital admission, inability to prepare and/or buy food, infection, feeling unwell, new medications, gastrointestinal issues, pain, depression, anxiety, food insecurity, poor knowledge of nutrition and poor dentition or dysphagia can all lead to malnutrition and serve as barriers to wound healing. Malnutrition can lead to lack of energy, prolonged hospital stays and/or recovery time, increased risk of dehydration, increased risk of infection, delayed wound healing and increased fall risk.

Nutrition and Wound Healing

Every phase of wound healing requires adequate nutrition; protein that is consumed is broken down into amino acids that are used to rebuild and repair tissues. Malnutrition leads to delayed healing time by prolonging inflammation, increasing angiogenesis and fibroblast metabolism, and prolonging the time required for extracellular matrix remodeling. Malnutrition (especially if it causes dehydration and/

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¹ In vivo study EM-13977.

² 3M data on file. 34-8719-9395-1_BG_IFU.

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⁴ 3M data on file. Claim-sheet-US-05-291517_6.

or anemia) is associated with increased risk of developing wounds like pressure injuries.

Malnutrition cannot be treated if clinicians are unaware of it. It is important to ask patients open-ended questions. Ask questions that are not related to eating (e.g., about diabetes management, recent bloodwork, social network, employment status, household dynamics), ask about nutrition knowledge and/or previous nutrition education and, if possible, ask family members and other care supporters questions about the patient's lifestyle. Some questions that clinicians can ask to gain a more complete picture of a patient's nutrition include:

- What are your favourite protein foods to eat?
- How many meals do you eat each day?
- How often do you eat meals alone?
- What foods have protein in them?
- How do you get your meals?
- Who cooks at your house?
- What did you have for breakfast today?
- How do you get your groceries?
- How would you describe your appetite?

Early detection and nutrition intervention are important for pressure injury and malnutrition prevention. Nutrition screening can be the first step in identifying patients at risk for malnutrition. There are a variety of practical, easy-to-use and cost-effective nutrition screening tools available. These can be found on Wounds Canada's [Additional Best Practice Resources](#) page. The Canadian Nutrition Screening Tool (CNST) is composed of two questions:

- Have you lost weight in the past six months without trying to lose weight?
- Have you been eating less than usual for more than a week?

If the patient answers yes to both questions, a dietitian referral is recommended to confirm malnutrition. This tool has not yet been validated for use in the community setting.

It is important to remember that blood work is not always necessary to confirm malnutrition. A conversation about nutrition may give you enough information on a patient's nutrition status to initiate a dietitian referral. Previously, albumin was considered a good predictor of protein intake, but it is not always reliable, especially for patients with

wounds. Because albumin levels can be elevated with dehydration or lowered with inflammation, it can give clinicians a false picture of a patient's nutrition status. Currently, there is no specific marker for malnutrition.

Wound healing increases a patient's daily energy (calorie) need. Weight monitoring can help prevent malnutrition. Significant weight loss is a red flag; clinicians should refer patients to a dietitian when significant unintentional weight loss (5%) occurs. If possible, clinicians should obtain a patient's weight history on admission and weight should be taken monthly in long-term care. Loose-fitting rings, watches and even dentures can be indicators that a patient has lost weight.

Wound healing also increases a patient's daily protein requirements. Clinicians should encourage patients to take in consistent protein and calories throughout the day to encourage protein sparing and avoid having protein being broken down and used as energy.

Adequate hydration is required for the perfusion of oxygen and nutrients to wound tissue for repair. Clinicians should educate patients on the signs and symptoms of dehydration. Soup and flavoured gelatin can be used to increase hydration.

Barriers and Supports

Purchasing and preparing healthy foods can be difficult for individuals with wounds. These patients may not be able to get to a grocery store (e.g., if offloading feet) or stand to prepare food at a counter or stove. Patients may rely on convenience stores or fast-food establishments, which typically offer fewer healthy options. A few potential solutions to these issues are food and grocery delivery apps, meal kits or community ride sharing.

Low-income households are at higher risk of food insecurity, which is associated with higher rates of diabetes, cardiovascular disease and hypertension. While these patients may not appear malnourished, referral to a social worker is indicated in these cases, as supplement coverage and special diet funding may be available. Clinicians should be aware of and able to communicate to the patient about possible government supports and/or benefits available and free food resources in their area.

Social media can be a large source of misinformation for patients. Clinicians can direct patients to accredited organizations who are now using social media, like Wounds Canada, Diabetes Canada, Dietitians of Canada and the Heart and Stroke Foundation. By engaging with these organizations, patients may be able to find a network of others in similar health situations and relieve feelings of isolation.

TIPS FROM THE EXPERTS: SCARS, FROSTBITE

*Session Speakers: Michael G. Brandt, MD MSc FRCSC;
Alexander Poole, MD FRCSC DiMM;
Josianne Gauthier, B.Pharm MSc Pharm CRE*

Complex Scars

Every surgical incision results in some form of post-operative scarring. Facial scarring has been correlated with reduced quality of life, negative perception of body image, decreased objective attractiveness and higher incidence of depression. Scars can be defined by their height, width, discolouration, distortion, texture, evidence of surgery, impact and camouflage.

“Unsatisfactory” scars can be pathologic (e.g., hypertrophic or keloid) or non-pathologic. Non-pathologic scars can be intrinsically unsatisfactory as a consequence of normal wound healing (e.g., wide scar, discolouration, raised/depressed, texture/surface irregularities) or extrinsically unsatisfactory from iatrogenic sources (e.g., misaligned wound edges, trap-door deformities, evidence of surgery). Treatments for intrinsically unsatisfactory scars are based on their features and might include revisions, make-up, resurfacing and/or filler. Scar location and/or position and distortion of surrounding structures can cause a scar to be extrinsically unsatisfactory.

When addressing unsatisfactory scars, surgeons aim for improvement over perfection and often wait for the scar to mature and for the patient to “own” the scar. Surgical techniques for scar revisions include fusiform excision, re-excision and close, Z-plasty (to reorient the scar), W-plasty and geomet-

ric broken line closure. Multiple procedures may be necessary to improve the appearance of a scar.

Frostbite

Frostbite is often a preventable injury. When extremity cold injuries occur, there are three phases: prefreeze, freeze and thaw. Frostbite occurs in the second and third phases. When the surface temperature of the skin reaches 15°C, pain occurs. At 7°C, numbness occurs; and at 0°C, frostbite occurs. Symptoms of frostbite include pallor and/or a waxy, blue appearance. Post-thaw, skin may appear pink, red, blue or grey. Additionally, blisters, edema and eschar may be present.

Freezing injuries like frostbite are caused by extracellular ice formation and osmotic pressure changes. During the thawing phase, vasoconstriction and microthrombosis occur. The faster the intervention in this injury, the better. There is a 28% decrease in salvage rate with each hour that passes.

Frostbite classification is based on acute physical findings:

- **1st degree:** numbness, erythema, white, yellow plaque, mild edema
- **2nd degree:** clear blisters, edema, erythema
- **3rd degree:** deeper, hemorrhagic blisters, beneath the dermal vascular plexus
- **4th degree:** through dermis and into subcutaneous tissue, into muscle and/or bone

First- and second-degree frostbite are considered *superficial*, with minimal anticipated tissue loss, while third- and fourth-degree frostbite are considered *deep*, with deeper injury and anticipated tissue loss.

Rewarming

Rapid rewarming is best

Spontaneous thawing is next best

Do not increase freezing time

Warm water 37-39°C

Tolerable to unprotected hand for 30 sec

Until pink/purple and pliable

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The image shows a person in a red shirt standing next to a metal bucket filled with water. A hand is being held in the water, demonstrating the rewarming process. A small inset video shows a close-up of the hand being held in the water.

Bone scans have been found to accurately predict ultimate amputation levels.

A grading system has been proposed for hands and feet to predict outcomes:

- **Grade 1:** absence of cyanotic changes, no risk of amputation
- **Grade 2:** cyanosis in distal phalanx, moderate risk of amputation
- **Grade 3:** cyanosis into the middle phalanx, high risk of amputation
- **Grade 4:** cyanosis into the metacarpal/tarsal, amputation 100%

Basic treatment includes rapid rewarming, early movement, wound care, hydrotherapy and the use of advanced therapeutics, and avoidance of surgery.

Rapid rewarming is best, spontaneous thawing is next best. Freezing time should not be increased. Warm water (37–39°C) should be used; it is tolerable to an unprotected hand for 30 seconds. Skin should be rewarmed until pink or purple and pliable.

Topical Wound Preparations in Frostbite

While there have been over 40 publications on frostbite management from 1961 to today, wound care is only described in 26 and is often poorly detailed.

Antiseptics with a broad range of antimicrobials are often added to rewarming water and whirlpool hydrotherapy. Povidone-iodine and chlorhexidine are frequently used.

Silver nitrate is a compound with antiseptic properties that has similar effects as hexachlorophene

and povidone-iodine but can result in less pain and infection. However, it stains skin, clothing and linens.

Silver sulfadiazine is an antimicrobial cream that releases free silver ions in high concentration. This treatment is controversial as there is not enough evidence to know whether it promotes or slows wound healing, and it requires frequent application.

Aloe vera is an antimicrobial with anesthetic properties that inhibits thromboxane B₂ and limits the production of PGF_{2α}. In elevated amounts caused by frostbite, thromboxane B₂ and PGF_{2α} can cause vasoconstriction and platelet aggregation. Clinicians should avoid after-sun products as these often contain lidocaine and alcohol.

There is very little evidence or documentation of the use of topical antibiotics for treating frostbite.

Frostbite wounds should be left open as much as possible. Most dressings used for frostbite care are non-adherent, synthetic contact layers like silicone, paraffin, smooth acetate or petrolatum. Bulky dry dressings or gauzes like cotton, rayon and polyester are used as an outer layer to absorb excess moisture and protect from trauma by providing some padding. Occlusive dressings should be avoided.

There are some anecdotal reports on the use of either hydrofiber silver dressings that release silver ions in a sustained fashion or silver foam dressings for frostbite management. These dressings have been used with the goal of reducing bioburden and treating local infections, but they do not promote wound healing. 🇨🇦



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