

October 14–18, 2020

Wounds Canada 2020 Virtual Conference: Moving the Dial on Patient Outcomes



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and Heather Ibbetson, BN BA

Session Summaries

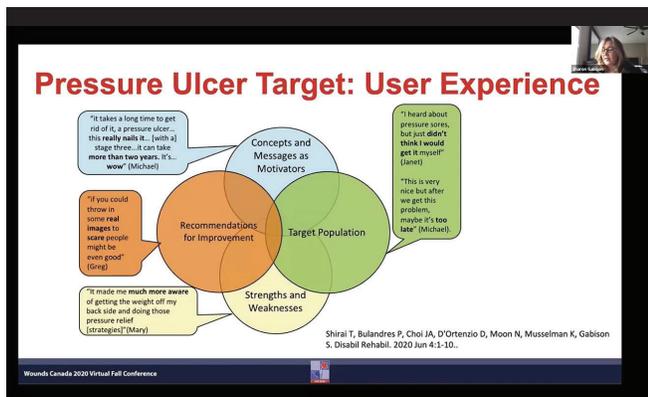
Wounds Canada held its fall 2020 conference as a virtual event October 14 to 18. The event incorporated the Alberta regional conference that had originally been planned for April but was postponed due to the COVID-19 pandemic, the fall conference and the one-day Limb Preservation Symposium into a single mega event. The session summaries that follow include highlights and practice pearls from the fall conference sessions.

PRESSURE INJURIES: THE “SCARLET LETTER” OF PATIENT CARE

Session speakers: Joyce Black, PhD RN; Sharon Gabison, PhD MSc BScPT; Amit Gefen, PhD

Amit Gefen began the session with a brief introduction of the development of pressure injuries (PIs). PIs can be caused by body weight alone, as well as external forces, including medical devices. Regardless of the source of pressure, cells under-

go distortion and deformation, eventually leading to loss of function. He compared the loss of cell integrity due to pressure to when a building loses its structure. When the cell membrane has pores or when the cytoskeleton loses its integrity, the cell collapses. The damage caused by cell deformation initiates and perpetuates a vicious cycle: constant pressure leads to cell deformation and cell death, which leads to inflammatory edema and increased interstitial pressure. This



further distorts the cell, leading to increased poration of the cell membrane and loss of cytoskeleton integrity. He concluded by outlining how COVID-19 increases the likelihood of PIs via the following mechanisms:

- Endothelial dysfunction, which leads to edema
- Increased clotting/thrombosis, which leads to decreased tissue perfusion and oxygenation
- A long list of medical devices used to manage patients with COVID-19 complications
- Use of prone positions for patients with COVID-19 complications
- A cytokine storm, which delays the body's normal response to tissue injury

Joyce Black focused on the need to educate care providers to prevent PIs as a result of COVID-19 management. She mentioned several strategies to prevent PIs when the patient is prone. She recommended that clinicians consider:

- Using support services designed for ICU patients
- Being mindful of ET tube placement
- Lubricating the eyes with eye ointment and taping closed
- Applying dressings around the face
- Applying dressings to high-risk areas, such as shins, hips and dorsum of the feet
- Placing the head on a pillow and turned sideways, and rotating sides every two hours
- Rotating side (of the body) every four hours
- Placing the patient in "swimmer's" position (one arm up, one arm down), without causing increased tension or extension on the patient's joints and tissues

She mentioned the National Pressure Injury Advisory Panel (NPIAP) position papers on COVID-19 and PIs, reminding attendees that not all COVID-19-related PIs are avoidable. Some wounds behave like PIs but are a result of COVID-19 and not necessarily a product of pressure. Black stated the importance of using artificial intelligence (AI) to predict and measure risk of developing PIs more objectively.

Sharon Gabison talked about different technology designed for education and management of pressure injuries. The SensiMAT is a pressure-sensitive mat designed to be placed under a wheelchair cushion. The associated application in conjunction with the mat gives real-time data on the pressure the patient is placing on the wheelchair cushion. This in turn prompts the patient to reposition. From the data collected, Gabison and her team realized the frequency of repositioning is sub-optimal, and hand-dominance plays a part in repositioning behaviours.

The second technology she discussed is the Pressure Ulcer Target (PUT). This application consists of six modules for PI information and education.

She also presented information about the Pressure Injury Management and Education (PrIME) technology and application. PrIME uses machine-learning to evaluate a patient's position in bed and can prompt the patient or care partner to reposition based on pressure data. A bedside computer prompts the care partner and patient. The program also includes education modules.

CHRONIC EDEMA MANAGEMENT ACROSS HEALTH-CARE SECTORS: STRATEGIES FOR SUCCESS

Session speakers: David Keast, MSc BSc(Hon) DipEd MD FCFP (LM) CCFP; Christine Moffatt, PhD RN CBE; Deirdre O'Sullivan-Drombolis, MCISc-WH BScPT; Martina Reddick, RN CLT

David Keast began the session by defining chronic edema and its relationship with lymphedema. Physiologically, lymphedema is defined



Cellulitis in Leg Oedema

7477 (chronic oedema of the leg)

- 15.78% cellulitis in last 12 months
- 37.4% life time prevalence

Risk factors

| | OR | CI |
|---------------------|------|-------------|
| Wounds | 2.37 | 2.03 - 2.78 |
| Morbid obesity | 1.51 | 1.27 - 1.80 |
| Obesity | 1.21 | 1.03 - 1.41 |
| Midline oedema | 1.32 | 1.04 - 1.66 |
| Male sex | 1.32 | 1.15 - 1.52 |
| Diabetes | 1.27 | 1.08 - 1.49 |
| Controlled swelling | 0.59 | 0.51 - 0.67 |



and health services. Some of the key takeaways from the LIMPRINT study include:

- Chronic edema is a significant and largely unrecognized health problem that is costly to health systems
- In-patients can have chronic edema
- Chronic edema is common in primary care
- There is a high association of chronic edema with wounds
- Cellulitis, wounds and obesity are major risk factors
- Effective treatment to control chronic edema is a modifiable risk factor

as accumulation of protein-rich fluid in the interstitial space. Clinically, lymphedema is chronic (lasting more than three months), responds minimally to elevation and/or diuretic therapies and is accompanied by one or more secondary skin changes. Traditionally, it was believed that all fluids filtered out of the capillaries are reabsorbed. Newer studies suggest that almost all of the excess tissue fluids are handled by the lymphatic system. Lymphedema can result when filtration is greater than absorption (e.g., in venous disease, chronic heart failure) or when filtration is less than absorption (e.g., when lymphatic obstruction or dysfunction is present). Lymphedema is associated with a multitude of comorbidities, including venous disease, trauma, obesity and infection. Management of lymphedema includes skin care, education, manual lymphatic drainage, exercise, compression garments and management of underlying etiologies.

The LIMPRINT Study

Christine Moffatt presented LIMPRINT, an international study of the epidemiology of lymphedema. LIMPRINT encompasses different types of practices (e.g., in-patient care, primary care) across several countries. The goal of the study was to develop and validate an international prevalence methodology with an electronic system to assess the prevalence of chronic edema and chronic wounds, and their impact on individuals

Long-term Care

Martina Reddick spoke about the barriers and strategies of lymphedema management in long-term care (LTC) settings. Barriers of lymphedema management in LTC may include inactivity and muscle weakness, which add to the difficulty to manage, and social and safety impacts of certain treatment options. Other barriers and gaps include lack of knowledge in diagnosis and management of lymphedema as well as lack of clinical skills. There may also be limited numbers of and access to specialists and limited resources. The clinical complexity of LTC residents (e.g., in areas such as cognitive ability, mobility and obesity) is also a barrier to the management of lymphedema in the LTC setting. Some of the strategies to overcome these barriers include a broad-based education plan for practitioners, development of interprofessional teams with specialist availability, development and/or review of electronic plans to include chronic edema, and the need for clinical practice guidelines to address chronic edema and how to manage complex cases.

Adjunctive Therapies

Deirdre O'Sullivan-Drombolis discussed several strategies for the management of chronic edema in acute care settings. Compression is still a gold standard; however, intermittent pneumatic compression (IPC) and kinesiotaping may be effective adjunctive therapies for the management of chronic edema. Exercise is also important;

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emerging studies show that breath work may also be beneficial. She reminded attendees that the patient is the “common denominator” between all of the health-care practitioners, so patient education, empowerment and collaboration are paramount to positive health outcomes.

WOUND CARE CHALLENGES IN INDIGENOUS COMMUNITIES

Session speakers: Daisy Sugarhead, RN BScN Anishnawbe Mushkiki Eqway; Heather Wright, MCISc-WH BScN NSWOC WOCC(C)

Daisy Sugarhead and Heather Wright are both registered nurses who work in remote First Nations communities. The objectives of this session were to discuss the wound care challenges in remote First Nations communities,

explore options to overcome such challenges, and discuss and apply the principles of Truth and Reconciliation to wound care in remote First Nations communities.

Currently, in many remote First Nations communities, patient care is often outsourced to neighbouring urban centres. An example Wright gave was wound debridement, where patients from First Nations communities are transported by air to an urban centre to receive care. This pro-

Historical Barriers to Practice Implementation

- Colonial legacy
 - Residential School System¹
 - Ministry of Natural Resources
- Data collection and management²
 - Lack of quantitative data
 - History of abuse of health information

1. Truth and Reconciliation Commission of Canada (2015). What we have learned: Principles of Truth and Reconciliation. Pg. 1, 156.
2. Snelgrove, J., Frimstone, M. (2015). Back to the basics: Identifying and addressing underlying challenges in achieving high quality and relevant health statistics for indigenous populations in Canada. *Statistical Journal of the IACR*, 31(1), 67-87. <https://doi.org/10.3233/SJL-150264>

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cess may take up to three days, during which the patient is removed from their community. This is not only costly financially but can also be emotionally and physically exhausting for the patient.

Sugarhead and Wright described some of the wound care challenges of inaccessibility. Primary health care is delivered at nursing stations. Challenges and barriers to practice implementation include fluctuating provincial and national funding structures, transient/rotating nursing staff that lead to a lack of continuity of care, limited availability of wound care supplies, underutilized technology, limited access to clinical experts, and lack of use of validated assessment tools and consistent documentation.

Environmental barriers to care exist in these communities as well. Electricity, water and heating system interruptions can lead to disruption in care delivery. Water quality, food scarcity, transportation to/from clinic and housing/overcrowding are also challenging to community health and care delivery. For example, members of these communities are 10 times more likely to develop an invasive group A *Streptococcus* (iGAS) infection than the provincial and national averages.

Historical Barriers

Beyond the physical barriers to implementing care, the historical barriers are also challenging to overcome. Sugarhead shared powerful anecdotes from her own traumatic experiences as well as from the members of her community. Colonialism forced First Nations people to live in new types of communities and against their traditional way of living. The introduction of canned food versus fresh food led to health problems. Residential schools caused physical, mental and emotional trauma to First Nations communities. There is a continual process of forcing First Nations people to live a certain way, and to control their natural resources, even in the present day.

In addition, there is a history of abuse of health information, which included unethical experimentation on First Nations people (e.g., sending untrained/under-trained practitioners to these communities to provide care) and selling health

information to pharmaceutical companies. Also, there is a lack of quantitative data.

Solutions

Solutions to practice implementation barriers include:

- The use of validated assessment tools, such as Inlow's 60-second Diabetic Foot Screen, to inform care
- Education for personal support workers and home care staff in the areas of wound management and prevention delivered at a community level and via virtual platforms
- The delivery of health care that is reconciliation-focused, recognizing the truths of the past and moving forward in a respectful and healthy manner. This includes "supporting Aboriginal peoples' cultural revitalization and integrating Indigenous knowledge systems, oral histories, laws, protocols and connections to the land into the reconciliation process" (Truth and Reconciliation Principle #7), as well as "respecting and taking into account the perspectives and understandings of Aboriginal Elders and Traditional Knowledge Keepers of ethics, concepts and practices" (Truth and Reconciliation Principle #8).

THE MANAGEMENT OF COMPLEX WOUNDS: BURNS AND BEYOND

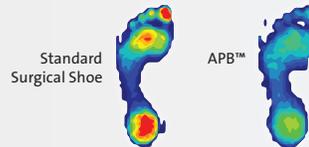
Session speaker: Shahriar Shahrokhi, MD FRCS C FACS

The objectives of this session were to identify management strategies for complex wounds in multi-trauma patients and to discuss the importance of interprofessional teams and pain management when managing these patients.

Traumatic wounds include abrasions/friction injuries, degloving injuries (open vs. closed), open fractures, eviscerations and pressure necroses. Traumatic wounds can be complicated by infections, such as necrotizing soft tissue infections and periwound cellulitis. The approach to com-

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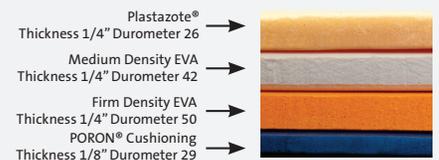
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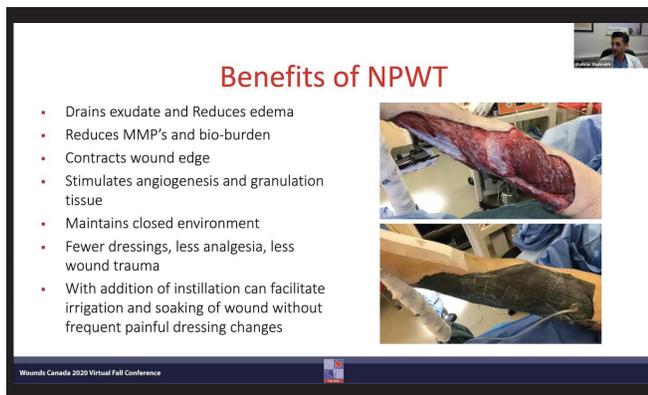
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plex wounds in multi-trauma patients should be as follows:

- Consider patient’s clinical priorities
- Temporize wound until more pressing issues have been addressed
- Life or limb preservation supersedes most wounds, unless wounds are connected to life or limb preservation
- Large wounds have significant metabolic demands; nutritional support is crucial
- Complex and large wounds are significant risks for systemic infection

There are systemic and local barriers to wound healing and treatment. Systemic barriers include age, malnutrition, immune suppression and comorbidities. Local barriers include bleeding, tissue hypoperfusion, wound soilage (through fecal matter) and wound infection. Topical solutions and dressings may be useful in reducing bioburden; however, long-term use of these agents may delay wound healing. Negative pressure wound therapy (NPWT) is a helpful adjunct and alternative. NPWT helps to reduce edema, bioburden and matrix metalloproteases (MMPs); contract the wound edge; stimulate angiogenesis and granulation; and reduce the amount of dressing changes. The addition of instillation with polyhexamethylene biguanide (PHMB)-based or hypochlorous acid-based solutions to NPWT can facilitate irrigation and soaking of the wound.

Shahrokhi compared biofilm on a wound to a “shield around a starship,” where topical and systemic antimicrobials cannot penetrate the wound. Biofilms can form as early as eight hours on a

wound and increase oxidative and inflammatory stress on the wound, delaying healing. Biofilms can be disrupted by mechanical means (e.g., surgical and ultrasonic debridement, hydro-dissection) or irrigation solutions (e.g., PHMB- or hypochlorous acid-based solutions). Early reduction or disruption of bioburden and biofilm is therefore important for optimal wound healing.

Shahrokhi provided several examples of multi-trauma patients with complex wounds. The common management plan includes early debridement of necrotic tissues to improve granulation, fecal diversion via tubing or ostomies, and temporizing wounds with NPWT with instillation until further operations. NPWT with instillation decreases bacterial load and disrupts biofilm, and also “buys time” to optimize the wound bed. Once the wound bed is free of necrotic tissue, wound closure may be achieved via skin flaps and grafts. It is important to remember that wounds may be temporized while other pressing issues (e.g., metabolic, systemic) are being addressed.

Patients may experience different types of pain: background, breakthrough, procedural and postoperative. Practitioners must recognize the cause and nature of pain. Pain control is paramount to optimal management for multi-trauma patients, as this influences their adherence to the treatment plan and trust in the interprofessional team. Unresolved pain may lead to chronic pain, depression, post-traumatic disorders and suicidal thoughts. Pain is universal to all trauma patients, and therefore must be addressed adequately.

TEST YOUR KNOWLEDGE ON NUTRITION AND WOUNDS: PRACTICAL TIPS FROM THE EXPERTS

Session speakers: Christin Barber, RD; Lindsey Zwicker, RD

Malnutrition is a nutritional imbalance of energy, proteins and nutrients. Christin Barber noted that approximately 45% of patients hospitalized in Canada experience malnutrition. The goal of

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- Obtain current weight
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- Protect meal time
- Meal set up
- Suggest an oral nutrition supplement

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treatment should include optimizing nutritional status, preventing further decline and addressing the root cause of malnutrition.

The use of validated screening tools is important in identifying patients who experience malnutrition. The Canadian Nutrition Screening Tool (CNST) and Malnutrition Screening Tool (MST) are two examples of validated screening tools for malnutrition.

Energy is something everyone needs. Normal caloric intake is 25–35 calories/kg. High-calorie foods include whole milk, soy products, full fat cheese, nuts and seeds, sweets and desserts, added fats (e.g., butter, oils), many frozen dinners and smoothies. Practitioners must consider the patient's nutritional instrumental activity daily living (IADLs) and activity of daily living (ADLs).

Normal protein intake is 1.25–1.5 g/kg/day. Protein requirements increase in malnourished patients and those living with a wound. High-protein foods include meat and fish, legumes and lentils, nuts and seeds, eggs and soy products.

Practitioners need to investigate if dentition is an issue if there is a change in appetite or food intake. Another factor to consider is cost of groceries and food, which may increase with decrease in supply and/or increase in demand.

Adequate fluid intake is also very important because fluids are the “body's transportation system.” A minimum of 1500 mL/day of fluid intake is recommended. Fluids may include water, milk, juice, broth/soups, coffee and tea. Practitioners and patients can use visual cues or technology to encourage fluid intake. Barber also suggested

carrying a water bottle everywhere and having a beverage with every meal.

There is not clear evidence to suggest that adding vitamins and minerals is beneficial. However, if a lab-diagnosed deficiency exists, supplementation with multivitamins and minerals can be initiated. Vitamin A, C and zinc are important nutrients to support wound healing.

They concluded the session by going through two case studies with attendees. Some of the strategies employed in both cases included the use of a screening tool for malnutrition, use of grocery delivery, smaller meals timed with TV programming, oral nutrient supplementation taken with medications, adequate protein intake, and multivitamin and mineral supplementation when deficiencies are identified. Barber and Zwicker encouraged attendees to be educated about malnutrition via Canadian Malnutrition Task Force resources and to use validated screening tools for malnutrition. A competency checklist can also be helpful.

THE TREATMENT OF ACUTE AND CHRONIC OSTEOMYELITIS IN FOOT ULCERS: WHAT'S NEW?

Session speakers: Lawrence Lavery, MPH DPM; Edgar Peters, MD PhD

Edgar Peters began the session by presenting the epidemiology of foot infection in diabetes. According to research, the lifetime risk of a diabetic foot infection is 4%, and 50% of diabetic foot ulcers (DFUs) are infected at presentation. The EURODIALE study indicated that 18% of diabetic foot ulcers present with osteomyelitis (OM). Infected foot ulcers often lead to amputations.

Peters presented the PEDIS assessment tool for assessing DFUs. PEDIS stands for perfusion, extent, depth, infection and sensibility (i.e., presence of neuropathy). He then elaborated on the “infection” aspect of the tool, which correlates with the Infectious Diseases Society of America (IDSA) Diabetic Foot Infection classifications.

Grade 1 = no signs and no infection. Grade 2 = mild infection, where the patient presents with two or more signs of infection. Grade 3 = moderate infection, where periwound erythema extends to and beyond 2 cm or when there is a deep infection present. Grade 4 = severe infection, where the patient experiences systemic inflammatory reaction syndrome (SIRS) with signs and symptoms such as tachycardia, fever or hypothermia, tachypnea, and leukocytosis or leukopenia. Grades 3 and 4 can be categorized with or without co-existing OM.

He reminded attendees repeatedly that infection is a clinical diagnosis. Wound swab cultures may not be useful, as most long-standing wounds are heavily colonized. Lab diagnostics such as inflammatory parameters are often normal, even in patients with a foot abscess. Signs and symptoms of infection may also be mild despite a serious infection, especially in patients with peripheral arterial disease.

Peters presented research evidence on the efficacy of different diagnostic tools for OM.

- A positive probe-to-bone (PTB) test may be helpful to rule in OM in high-risk patients; a negative test may be helpful to rule out OM in low-risk patients.
- Plain X-rays are only marginally predictive if positive (e.g., bone destruction/osteolysis). Negative results are even less predictive.
- MRIs have a higher diagnostic odds ratio than a PTB test, where bone edema may be visualized.
- PET-CT scans have an even higher diagnostic odds-ratio than MRI (95 vs. 42).

- A bone biopsy can provide histological evidence of infection.

Wound culture swabs are easy to employ; however, wound cleansing and debridement must be performed first. Additionally, wound culture swabs may not identify anaerobes or possibly gram-negative rods bacteria. Peters presented a study where the concordance between a superficial wound swab culture and bone biopsy was 22%. If the treatment was based on the superficial wound swab culture, there was only a 1-in-5 chance of targeting the microbes accurately.

Evidence shows that there is no difference among antibiotic regimens except tigecycline isn't as effective as ertapenem and ertapenem isn't as effective as piperacillin/tazobactam. He stated that when selecting an antimicrobial, practitioners should take into account the local resistance profile and, importantly, aim to reduce a patient's exposure to antimicrobials. This can be achieved by narrowing the antimicrobial spectrum when possible—based on knowing the local resistance profile, obtaining high-quality tissue samples and seeking specialist advice—and a shorter treatment duration (in combination with surgery and education). One to two weeks of antimicrobial treatment is usually adequate for soft tissue infection; less than six weeks of treatment is adequate for bone infections (5–7 days if complete resection surgery was performed). Ultimately, there is no “silver bullet” when selecting an antimicrobial agent. For a detailed list of suggestions based on evidence, Peters encouraged attendees to consult the International Working Group on the Diabetic Foot (IWGDF) Guidelines.

Lawrence Lavery continued the session by discussing standard and new approaches to identifying and managing acute and chronic OM in patients with diabetes. The question arises: Which is more effective—surgical treatment or medical treatment of OM? Surgery allows practitioners to remove the infected bone, correct bony deformities and biomechanics, identify pathogens via bone biopsies and shorten antibiotic exposure along with its side effects. Medical treatment allows patients to avoid surgery and anesthesia

**Summary of treatment guideline
DFI**

Reduce patients' exposure to antimicrobials

1. Narrowest antimicrobial spectrum possible
 - a) Know your local resistance patterns
 - b) Obtain high-quality samples
 - c) Obtain specialist advice
2. Shortest duration
 1. Use of surgery (gangrene, abscess, compartment syndrome)
 2. Education (guidelines and implementation)

risk and maintains foot structure and biomechanics. The cost of surgery is beyond financial. Amputations and bone resections change the bony structure and biomechanics. This can cause new deformities, increase plantar pressure and the risk of ulcerations and transfer lesions. Surgery can increase the risk of deformity and ulcerations; therefore, it is imperative for surgeons to aim to preserve function. Success and remission of surgery and medical treatment are similar—this is also dependent on whether a clear margin of bone can be achieved via surgery.

THE IMPACT OF COVID-19 ON PATIENTS WITH WOUNDS: A NATIONAL PERSPECTIVE

Session speakers: Maureen Charlebois, BSc MD FRCPC(Med, Derm) MACP FAAD Med FAPWCA DSc(Hons); Crystal McCallum, MCISC-WH BScN RN; Ranjani Somayaji, MPH BScPT MD FRCPC

Janet Kuhnke et al. conducted a qualitative study that aimed to capture the experience of wound care clinicians during the early days of COVID-19 in Canada.¹ The goal was to understand how COVID-19 has impacted the delivery of skin and wound care. In collaboration with Cape Breton University, Wounds Canada worked to create an online qualitative survey, which was followed up with surveys at three, six, nine and 12 months. A majority of respondents were frontline clinicians

(89%). Ontario was the most geographically represented province, where more than 50% of respondents were located.

The study's preliminary findings showed a reduced satisfaction with the availability of generalist staff, virtual care and specialist staff members' ability to perform wound or skin care. Additionally, the availability of and satisfaction with generalist staff was assessed. 84% of organizations had a generalist staff member who performed wound care as part of their daily activities. 83% of respondents were either very satisfied or satisfied with the availability of generalist staff to perform this care. However, this number dropped to 60% during the pandemic.

Respondents were also asked to reflect on their experience with virtual care. Virtual care was defined as care occurring remotely using any type of technology. Prior to the pandemic, 75% of respondents indicated that generalist staff used virtual care as a part of wound care. 59% of respondents were either very satisfied or satisfied with the availability and effectiveness of virtual care used in wound care. However, during the pandemic, the number of respondents who were very satisfied or satisfied dropped to 44%.

Prior to the pandemic, 69% of organizations had internal specialists on contract who performed wound care with patients. 79% of respondents reported being very satisfied or satisfied with the availability of the specialist to perform the care. Again, this satisfaction dropped to 58% during the pandemic. When asked to reflect on the use of virtual care by specialist staff, 48% indicated that specialist staff used virtual care to facilitate wound care before the pandemic. Prior to the pandemic, 51% of respondents were either very satisfied or satisfied with the availability and effectiveness of virtual care used by specialist staff to facilitate wound care. During the pandemic, the satisfaction dropped to 49%.

A number of other observations were recorded during the preliminary research phase:

- Some wound clinics were temporarily shut down. This forced providers to engage in virtual technology from a remote setting.

Emerging Themes

- Some wound clinics were temporarily shut down, triggering the use of remote technology
- Access to said technology by healthcare providers was not always reliable nor user friendly
- Families and clients did not always have access to technology nor the expertise to use it
- Healthcare providers endeavored to adapt and be flexible
- An existing lack of professional development was exacerbated by the pandemic

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WWW.WOUNDCANADA.CA/WCI-HOME

- Access to remote technology can be challenging. It is not always readily available nor was it guaranteed to be user friendly.
- Families and patients did not always have access to or expertise with the technology required to receive virtual care.
- As a result of the above, health-care providers had to adapt and be flexible in their care.
- An already existing lack of professional development was made worse by the pandemic.
- Several themes emerged from the preliminary data, including patient safety, availability of PPE and use of virtual care.

In her own facility, Charlebois and her team developed and implemented a PPE program for home-care staff. To address the fears of patients and families, regular communications were initiated through email and phone. This proved to be beneficial, as families and patients felt safer allowing staff in the home. There has been an increased focus on cleaning and infection control practices for staff. This ongoing education has provided staff, patients and families relief from fear.

Health-care workers need support for dealing with these additional protocols and stressors. Somayaji highlighted the challenge of adapting to constant change in various settings. In wound care, one focus has been to help patients become more autonomous quickly. In Calgary, a hybrid model allows in-person consultations when safe, while offering virtual care to those at high risk. There has also been a push to see vulnerable patients who have not had contact with the team.

McCallum noted a shift in emphasis toward empowering patients to perform their own activities of daily living, such as dressing changes, in long-term care. However, in acute care, patients are necessarily more dependent on staff.

It was essential to create PPE guidelines from the outset for patients and staff, such as guidelines for any household that had a positive case or was in isolation and additional information for staff about wound care and how to address patient and family fears. Throughout the pandemic there has been an increased burden on

health-care providers to educate staff, patients and families on safety protocols.

Virtual Care

When discussing treatment modalities that can create self-care and be managed virtually, Somayaji suggested that creating a foundation is important. Charlebois shared her experience with virtual care. Bayshore has a care path program that supports cancer patients after hours. Patients can also call for a review of their medication or care plan. Through virtual care, a patient has an interdisciplinary consultation. Nurses can also virtually contact the wound care specialist if they need support with in-home care. McCallum noted that additional successes are patients who are now able to apply negative pressure wound therapy or electrical stimulation at home. However, budgetary concerns will likely be at the forefront in a post-COVID world. Patient autonomy and leveraging technologies should be a focus.

1. Kuhnke J, Jack-Malik S, Botros M, Rosenthal S, McCallum C, Bassett K. Early COVID-19 and the experiences of Canadian wound care clinicians: Preliminary findings. *Wounds International*. 2021;12(2):14–19.

RAPID-FIRE DIAGNOSIS: DERMATOLOGY FOR WOUND CARE CLINICIANS

Session speakers: Jaggi Rao, MD FRCPC; Pat Coutts, RN

Clinical signs associated with wounds include:

Slough, or avascular devitalized tissue, is typically seen during the healing process or when in stage 3 or higher pressure injuries.

Eschar or **necrotic tissue** is dead tissue. It is usually present with full-thickness burns and necrotizing fasciitis. In most cases, best practice is to leave the necrotic tissue to ensure that the wound bed underneath is protected and bacteria do not get in.

Scabs are dried blood and serum. Scabs form as part of the healing process due to ruptured blood vessels that release clotting and other substances.



Granulation tissue is a deep, beefy red. It can be healthy and pink and red, but dusky red could be concerning and a sign of ischemia. Healthy granulation tissue should not bleed.

Epithelialization is a pink colour and is typically a good sign. It normally signifies the final stage of healing.

Prolonged moisture can appear as a doughy pink or can be white discoloration in the feet and palms and can be causative of an ulcer.

Undermined borders can be defined when a finger can be circulated around and under the borders. This is a sign of a severe and difficult to treat condition called **Pyoderma gangrenosum** (see below).

Atrophie blanche is a porcelain or ivory white and sclerotic or hard condition. This occurs when the skin contracts from scarring or fibrin

deposits. It may signal venous insufficiency or a possible start of skin breakdown.

Brown pigmentation of the skin is caused by hemosiderin deposition, which occurs when iron oxide from the breakdown of red blood cells deposits in the skin. It appears as splotchy red and brown on the skin. Laser procedures can assist in removing the pigmentation and trigger the immune system to take care of the hemosiderin.

Post-inflammatory hyperpigmentation is associated with melanin. It is not splotchy but more dispersed around an area. This condition occurs when the dermal and epidermal junction is disturbed, and the melanin is released.

Lipodermatosclerosis occurs in areas with little fatty tissue, such as in the lower calf. Hardening, thickening and tightening with sclerotic tissue is seen. It is believed to be related to venous insufficiency. Treatments related to improving venous circulation can help.

Pitting edema can occur due to inflammatory events, injury and decreased osmotic pressure (nephrotic syndrome).

Stasis dermatitis can be caused by venous stasis and is treated by topical steroids (ointments are preferred).

Pyoderma gangrenosum is a neutrophilic dermatosis. It can deteriorate quickly and should be treated right away. In the early phase this presents as a pustule with some swelling.

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Treatment should involve neutrophilic agents such as steroids and other heavy-duty treatments.

Erysipelas is similar to cellulitis (see below) and is a surface infection. It is fairly well demarcated.

Cellulitis is deeper than erysipelas (see above) and is found below the epidermis, in the dermis and subcutaneous tissue. It is less demarcated and more widespread.

Medium-vessel vasculitis appears as red blanching and later permanent erythema. It should be addressed with high-potency topical anti-inflammatories and a systemic treatment.

Calciphylaxis is a dermatology emergency as it can progress to necrosis. It may start as erythema then move to continuous erythema, excruciating pain, ischemia and necrotic lesions over days. It is often seen in end-stage renal disease.

Bullous pemphigoid is an autoimmune condition that results in blisters that can progress to a wound. It is typically seen in elderly patients.

Factitial ulceration results from an external ulceration, such as scratching.

Each of these conditions can present in a variety of health-care settings, and early treatment is crucial.

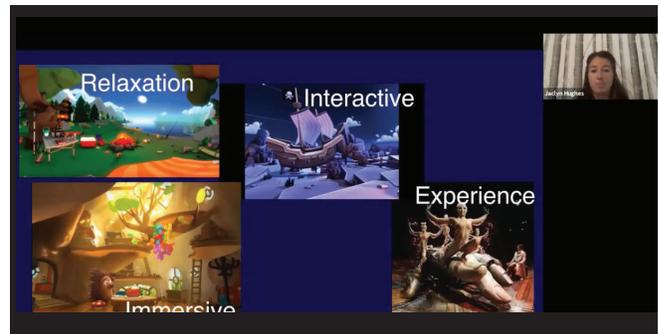
NEW PERSPECTIVES IN WOUND PAIN MANAGEMENT: CANNABIS, VIRTUAL REALITY AND BEYOND

Session speakers: Jaclyn Hughes, BMR(PT); Vincent Maida, BMR(PT)

The aim of this presentation was to encourage the readers to think about alternative pain relief mechanisms.

Virtual Reality

Jeffrey Spiegel found that the use of virtual reality in patients hospitalized at Cedars-Sinai Hospital in California reduced pain when compared with a control distraction condition. The results of a study indicated that virtual reality (VR) was an



effective and safe adjunctive therapy for pain management in the acute patient setting. Senior management was supportive of using virtual reality in Rockyview Hospital in Calgary based on the results from the U.S. described above.

Rockyview Hospital was the first to help patients use virtual reality to manage pain and anxiety in wound care. The cost of setting up and using the VR machine was \$400. The cost included the machine, special cover, wipes, patient bonnet and applications. Patients with high pain levels, anxiety or those who did not want to observe the dressing changes were included. Informed consent was obtained. Patients had to be able to sit in a high semi-Fowler's position to ensure equilibrium. Patients with active delirium, poor vision, open head or neck wounds, body parasites or eye infections, or in droplet or airborne isolation, were excluded. One patient, who required bilateral fasciotomies of his legs, called the virtual reality a godsend. He required both debridement and vacuum dressings. Once the virtual reality was added to analgesic intervention, the patient's pain went from a 10/10 to a 3–4/10. The patient also reported decreased anxiety.

One VR application offers different experiences that alternate to keep the patient engaged. It is called "Happy Place" or relaxation. It is the favourite of patients and the health-care team because it prolongs engagement. Another application tells a story and offers higher-level engagement. Interactive applications are also an option, where the patient can use a remote to connect stars or engage in similar experiences. The final application offers an experience, such as a circus. One important issue to note is that different VR experi-

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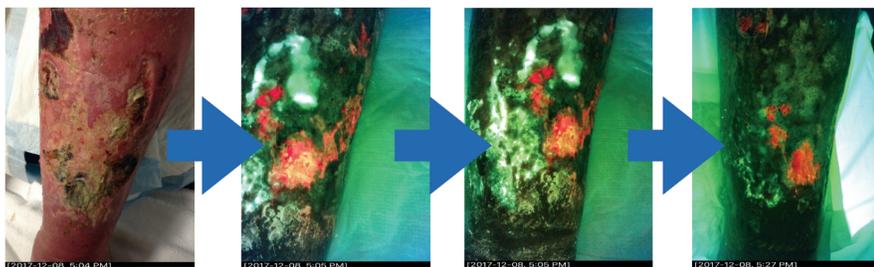
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Standard Image

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Post Saline Cleanse

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Excerpted from
 "Shifting Focus: Implications of Periwound Bacterial Load on Wound Hygiene"

By Rosemary Hill BSN CWOON WCCC (C) and Joshua Douglas MD, FRCP, ABIM
 Infectious Disease and Critical Care Internal Medicine, Vancouver Coastal Health



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¹ DaCosta RS et al. Point-of-Care Auto-Fluorescence Imaging for Real-Time Sampling and Treatment Guidance of Bioburden in Chronic Wounds: First-in-Human Results. PLoS ONE, 2015.

² Ottolino-Perry et al. Improved detection of wound bacteria using autofluorescence image-guided wound sampling in diabetic foot ulcers. International Wound Journal, 2017

³ Rennie MY et al. Point-of-care fluorescence imaging positively predicts the presence of pathogenic bacteria in wounds at loads $\geq 10^4$ CFU/g: a clinical study. J Wound Care (submitted).

⁴ Hill-Douglas et al. Shifting focus: implications of periwound bacterial load on wound hygiene. Infectious Disease and Critical Care Internal Medicine, Vancouver Coastal Health.

ences may not be suited to all patients. A bonfire experience, for example, may not be suitable for a patient who is undergoing a dressing change on a burn injury.

Following the first wound treatment, patients were identified as possibly benefiting from VR based on the inclusion criteria defined above. The health-care team mentioned the VR option to the patient and assessed interest. The patient then completed a pre-test, rating their pain, nausea and anxiety during wound care, and describing how they felt about returning for care and their overall experience. The next time the patient returned, they received VR during wound care. Following the care, the patient was asked to complete a post-test, which asked similar questions to the pre-test, with the added question about whether VR was helpful.

The early results were collated from 2017 to 2018 and included a total of 18 patients. The patient surveys demonstrated that there was a 68% reduction in patient discomfort and a 25% improvement in overall patient experience. 100% of patients found VR helpful. Since this study, VR has been used with other patients. Subsequently, not everyone has found it helpful, but a majority have. In addition, wound care staff also described lower levels of distress when delivering treatment to a patient who received VR. The staff attributed this to increased patient comfort during the procedure.

Challenges included funding, staff orientation, technical glitches, time, and infection prevention and control. Time has been the biggest challenge. The machines need time to charge, staff need time to clean the machines and applications can take time to load. Highlights include VR being used with more than 40 patients, its use during skin grafting procedures, an additional 10 units exploring the use of VR and interest in deploying VR in three other Calgary hospitals.

Cannabis

Vincent Maida introduced cannabis-based therapies. His objectives included challenging the status quo of wound and pain management and

introducing cannabis-based medicines as a frontier for wound management.

Between 17 and 65% of patients with non-healing wounds report pain, and pain intensity is associated with multiplicity of wounds. Females report higher pain scores. Malignant and perineal/genital wounds are the most painful. Associated symptoms include sleep disturbance, reduced quality of life and negative impact on emotional health.

Pain is located within wound beds and peri-wound tissues. Pain in wounds is the result of many factors such as necrosis, ischemia, infection and inflammation. Chronic pain drivers include sensitization, NMDA activation, hyperalgesia, allodynia and neuroplasticity.

Baseline pain refers to the average amount of pain that occurs over 24 hours. Breakthrough pain is a transitory episode that occurs with the background or baseline pain. Higher breakthrough pain is associated with higher baseline pain, anxiety and distress. Breakthrough pain can be broken down into idiopathic, incidental and end of dose. In incidental breakthrough pain, either volitional or non-volitional causes can be identified. In wound care, volitional pain results from debridement, injections or other procedures. Non-volitional pain can result from the patient moving or coughing.

The current paradigm for treating wound-related pain includes opioids, NSAIDs, gabapentinoids and SSRIs/SNRIs/TCAs. However, many of these medications can have harmful side effects, including addiction. Further, these medications do not often address breakthrough pain. Opioids and NSAIDs also inhibit the wound-healing process.

Recently, there has been exponential growth in cannabinoid research. The endocannabinoid system in the body has both extracellular and intercellular binding sites and has survived over 500 million years of evolution. Various types of receptors have been discovered in recent years. A recent systematic review by Abrams (2018) found conclusive and substantial evidence that cannabinoids are effective for pain. A double-blind case study involving a 35-year-old man with caustic chemical burns to both legs further

demonstrated the effectiveness of cannabinoids. The right leg had a THC/CBD ratio of 1:13 of medical cannabis oil applied, while the left leg had a ratio of 7:9. The patient experienced pain relief within 10 minutes that lasted for approximately six hours. The balanced THC/CBD oil had a longer-lasting effect. A small case study involving malignancy, epidermolysis bullosa, herpes zoster and pyoderma gangrenosum demonstrated the effectiveness of cannabinoids.

Cannabis agents can be administered through a range of modalities. Smoking is not recommended because it can be harmful for patients and bystanders. Vaporizing cannabis through a health-care approved device can provide an onset within five minutes and lasts up to six hours. Orals and edibles have a longer onset time but can last longer.

Adding cannabinoids to the pain management toolbox can help reduce reliance on adjuncts and opioids. Topical and vaporized cannabinoids can be used for breakthrough pain while orals and edibles can be used for baseline pain. Rapid release oral and nasal sprays are also being investigated.

DIABETIC FOOT AMPUTATION PREVENTION: PATHWAYS FROM ACROSS THE WORLD

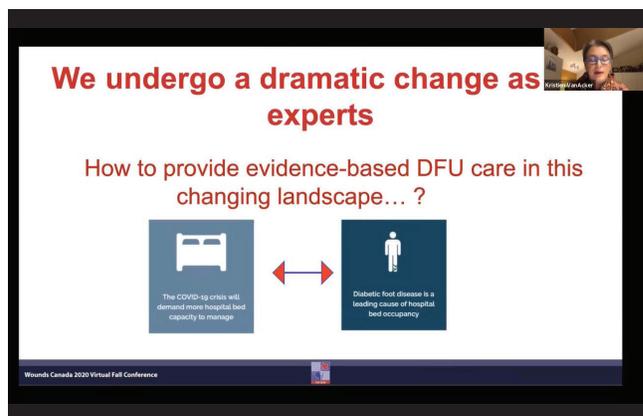
Session speakers: Karim Manji, DPM FACFAS; Harikrishna Nair, MD FRCPI FCWCS CMIA; Lee Rogers, DPM FFPM RCPS(Glas.); Gulnaz Tariq, RN BSN PGDip(Pak) IIWCC-UAE; Kristien Van Acker, MD PhD

Alberta, Canada

Karim Manji discussed the foot care pathway used in Alberta. Alberta has a public health-care system administered by the Alberta Health Services (AHS), which allows for interdisciplinary collaboration. With partners across the system, AHS has developed a screening tool, triage reform and improved knowledge.

The pathway has five main steps:

1. Screening the patient's feet



2. Documenting risk using an infographic created by the foot-care team
3. Referring the patient to a specialist if needed
4. Treatment
5. Follow-up screening

There are several findings that indicate the risk; these are listed on the assessment screening form. For instance, a red, hot, painful joint or Charcot foot is an urgent issue that should be addressed immediately. A callus or fissure is classified as moderate risk. The referral form combines findings and recommendations to best support patient care.

For the pathway to be effective there must be team members available at every level of care, and as the diversity of health-care teams increases, capacity also advances. This helps to support continuity of patient care, which is also important, particularly with high-risk patients, whose conditions can easily become urgent.

Barriers to practice change include few champions for the pathway across the province, variable screening and surveillance, and a lack of communication across the spectrum of care. Solutions to the barriers include a collaborative approach with strong communication.

Asia-Pacific Region

Harikrishna Nair discussed diabetic foot care in the Asia-Pacific region. In Malaysia, the prevalence of diabetes should be around 2.48 million people; however, during COVID-19, it is at 5 million people. A study conducted in Kuala Lumpur Hospital found many cases of plantar ulcers, with

41.5% having infection present. This demonstrates that foot care, blood glucose and blood pressure control are important, especially during the pandemic.

The Triangle of Wound Assessment is an effective tool for patient care. The triangle represents the three points of assessment: the wound bed, wound edge and periwound skin. Triage is an important step to ensure that care is provided appropriately. Wound clinics separate from the hospital can maintain most wound cases, excluding those that are critical. It is important to remember that those who are elderly or with diabetes may have diminished symptoms of sepsis.

Common complaints related to foot concerns include pain, erythema, swelling and the presence of an ulcer, and providers must have a high index of suspicion. Any patient presenting with breathlessness, fever or tachycardia (not from possible COVID-19) should be referred to a hospital ICU. Pain is a fifth vital sign and should be defined as neuropathic or ischemic and then treated accordingly.

Erythema should also be investigated for infection or inflammatory causes. Swelling can be identified as active Charcot foot or cellulitis. Patients with moderate to severe cellulitis should be admitted to hospital for systemic antibiotics.

The wounds can be classified as Infectious Diseases Society of America (IDSA) class one, two or three/four.

- A classification of one, no infection, should result in foot care advice and recommendations provided to the patient.
- Class two, or mild infection, requires oral antibiotics and foot care advice.
- Classes three and four require a consultation with a diabetic foot care specialist, and ICU admission if sepsis is suspected.

During the pandemic, all elective cases in Malaysia were postponed. Therefore, only moderate to severe cases requiring surgery were being treated. All of the care provided involves teamwork. Maggots, bioelectrical, mangosteen-based spray, lower-level laser therapy and oint-

ment-based treatments have also been initiated and maintained during the pandemic, despite inhibited resources. Key points: triage and treat early and refer when necessary.

Persian Gulf

Gulnaz Tariq discussed non-traumatic lower limb prevention pathways and the impact of COVID-19 on these pathways in the Gulf region. Wound care has changed significantly due to COVID-19. She stressed that the post-pandemic model of wound care may look different as well. COVID-19 caused restrictions, coverage issues and lack of community services for wound care. A team approach was also complicated by the pandemic, as staff members were recirculated to meet demands.

She discussed how her health-care team identified improper footwear and a lack of disease knowledge as the root causes of foot ulcers. A solution was developed to address this. It included patient education, staff and caregiver training, and a diabetic foot link nurse program in the facility. The challenges included a large percentage of undiagnosed or newly diagnosed patients, a huge portion of diabetic patients who were not screened for foot care and a general lack of awareness among health-care professionals. She and her team proposed early diabetes testing for overweight patients or those with prediabetic metabolic disorder, use of a 60-second foot screening tool and having every health-care provider treating patients with diabetes ask about foot care.

After utilizing the foot screening tool for one year, the results indicated that every patient was wearing improper footwear and a majority had callus formation. After four years, there was a reduction in improper footwear. Link nurses adapted patient information into different languages and ensured that all patients with diabetes were screened with Inlow's 60-second Diabetic Foot Screening Tool. There was also a significant reduction in amputations, from 13 to four annually. This demonstrates the importance of diabetic foot care screening tools.

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Europe

Kristien Van Acker discussed the European context of the pandemic and diabetic foot care and the importance of interdisciplinary teams because of the complexity of diabetic wounds. She and her team recognized that, although there were many interdisciplinary teams, there was a delay in referrals. The Fast-Track Pathway for Diabetic Foot Ulceration was distributed to general physicians, first in the United Kingdom and then across Europe. The tool has three pathways, which include improving healing time, salvaging limbs and reducing mortality rates. Unfortunately, pandemic impacts led to a rise in amputation rates. COVID-19 patients required hospital beds usually used for patients with diabetes.

The comorbidities of COVID-19 and diabetes have also become a concern. To address the possible domino effect from COVID-19, there needs to be a change to early detection. This will prevent additional hospitalizations on overburdened

health-care systems. Three initiatives have been effective in France, the UK and the Netherlands.

- In France, there was a communication network for open centres and available health-care workers. France also outlined what pathologies should be referred to which specialists.
- The United Kingdom has focused on continuity in transmural care. This initiative ensures that every patient with diabetes knows where to go to access foot care at all times, and also highlighted the importance of having podiatrists and nurse specialists in proximity to patients.
- In the Netherlands, an app was created with a learning program for foot care. It had an alarm to remind patients to check their feet and offered the appropriate resources to support patient and family empowerment and self-care.

United States

Lee Rogers discussed the impact of COVID-19 on diabetic foot pathways and how to triage diabetic foot patients based on frameworks in the U.S.,

where, like elsewhere, the pandemic has caused a disruption of care. In the U.S., wound care centres were closed despite being an essential service.

Pandemic-related Research

Three studies demonstrated how to convey the importance of wound care to policy makers and other important stakeholders.

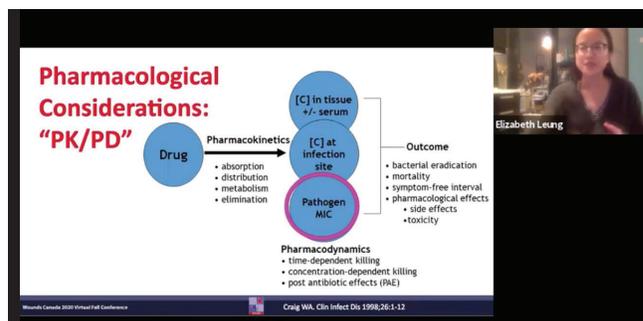
- In Italy, researchers suggested that the sudden disruption in executing diabetic foot care pathways delayed diagnosis and treatment, resulting in rapid patient decline.
- In the Netherlands, there were more severe presentations of vascular disease during lockdown than there were in previous years. Additionally, one hospital reported the rate of amputations tripling in 2020 compared with 2019. The researchers concluded that the switch to phone or video consultations left patients living with wounds and PAD without sufficient care. Patients in the Netherlands reported avoiding hospital and provider visits to not overburden the system during the pandemic. These factors led to a delay in diagnosis and care.
- In the U.S., one study found that the number of major limb amputations tripled, more severe presentation of patients occurred and the high-low amputation rate more than doubled. Team-based care was also noted as being disrupted and may have impacted the surveillance systems and clinic visits and increased patient reluctance to interact with the health-care system. This had the overall effect of delaying the presentation of problems.

THE MANY FACETS OF INFECTION

Session speakers: Chris Kandel, MD FRCPC; Elizabeth Leung, PharmD MSCI BCPS AQ-ID

Diagnosis and Treatment

Chris Kandel discussed when to culture a wound and when to be concerned about seeding a pros-



thetic joint. Bacteria on wounds are largely predictable. The context and location of the wound, in combination with the prior history of antibiotic use, can assist in determining the likely organisms that populate the wound. The Infectious Disease Union encourages the culturing of wounds when there is a plan to treat. Further, the Union recommends collecting pus without a swab. However, these recommendations are likely of limited value as the organisms cultured cannot be identified as pathogenic. Physicians can identify the antimicrobials to use without culturing by examining the wound and circumstance. Kandel noted that using amoxicillin and clavulanic acid or cephalexin and metronidazole can cover a broad range of anaerobes and pathogens.

There is very little evidence to indicate how long to treat, with a general range between five and seven days. However, cellulitis presents a special situation. If no purulence is present, the pathogen is likely *Streptococci*. Cephalexin or amoxicillin should be given for seven days. If there is purulence, the pathogen is more likely to be *Staphylococci* than *Streptococci*. Incision and culture, followed by trimethoprim and sulfamethoxazole for seven days, should be initiated. When the leg is red and difficult to diagnose, the clinician can raise the leg above the heart; if the erythema reduces, there is unlikely to be cellulitis. Antibiotics should be initiated if rubor, calor, dolor or tumor is present. Further, antibiotics should be used in the case of an abscess or when supportive management fails and the bioburden needs to be reduced. In these cases, therapy is more of an art than a science.

Pharmacology

Elizabeth Leung discussed the pharmacological considerations and challenges of managing wounds in complex patients. Some cases require antimicrobial intervention, such as when wound healing has stalled.

When selecting antibiotics, it is important to consider both the mechanism of action and the mechanisms of resistance. *Mechanism of action* refers to how the antimicrobial works. When pairing, the antimicrobials should have different mechanisms of action. *Mechanisms of resistance* refers to pathogenic resistance to antimicrobials. For instance, quinolone resistance can be as high as 50% in *E. coli*; therefore, using that antibiotic alone is not recommended. In complex patients, it is important to consider the interactions between the antibiotics and other prescribed medications.

Leung also highlighted the difference between pharmacokinetics and pharmacodynamics. *Pharmacokinetics* is described as what the body does with the drug. This would include how fast it is absorbed or how it is distributed. *Pharmacodynamics* refers to what the drug does to the body. For example, the minimum dose that kills the pathogen is measured in the lab with the culture taken. This helps determine how much of the antibiotic is needed and for how long. Pharmacodynamics can be best understood as the relationship between pharmacokinetics (such as the drug concentration in the body) and the drug effect.

Leung outlined the difference in relation to drug interactions. Pharmacokinetic interactions occur when Drug A affects the pharmacokinetics of Drug B, such as through absorption, distribution, metabolism or elimination. Pharmacodynamic interactions occur when the effect of Drug A is influenced by the effect of Drug B. This effect can be additive, antagonistic or synergistic. Additive effects can be seen between mycophenolate and amoxicillin or clindamycin, where non-infectious diarrhea can result. An antagonistic relationship can be seen between warfarin and vitamin K.

Both renal and hepatic function should be taken into consideration. Upwards of 90% of drugs are cleared renally. Diabetes, hypertension and age can all reduce renal function. The

liver produces albumin, which is what many antimicrobials attach to. Therefore, liver dysfunction can reduce the efficacy of the medication. Quinolones are discouraged for simple infections where better tolerated medications can be used. Oral beta-lactams have less bioavailability but have fewer drug interactions and are tolerated better. Topical preparations have been used since Socrates' time. These preparations may foster antibiotic resistance but have theoretical benefits such as higher local concentrations. Overall, these preparations are unlikely to reach the goal.

Kandel then highlighted that prosthetic joint infections are relatively rare, around 1–2%. These infections are not subtle, as there is usually a combination of symptoms, biochemical investigations, radiography and arthrocentesis. It is important to always look for a sinus tract and refer to a surgeon if concerned.

There is no uniform diagnosis of wound infection. There is also a lack of evidence for the optimal use of antibiotic in the setting of non-healing wounds. There need to be more studies in addition to home care creativity to ensure antimicrobials, if necessary, are given at the right time.

BARRIERS AND OPPORTUNITIES FOR VIRTUAL WOUND CARE: FUNDING, POLICY, TECHNOLOGY AND CLINICAL PRACTICE ISSUES

Session speakers: Trevor Champagne, MD FRCPC DABD; Christine Murphy, PhD RN WOCC(C); Laurie Parsons, MD FRCPC IIWCC

In this panel discussion, the first question asked was what barriers to care each panelist has encountered.

Trevor Champagne discussed several barriers to virtual care, including the quality of photographs, availability of virtual options and challenges with patient confidentiality and engagement. He noted that nothing can replace face-to-face care.

Laurie Parsons indicated that institution processes limit the ability to communicate with

LIMPRINT Leadership Impact and Promotion – International Wound Care Network

Wounds in Leg Oedema

Risk factors

| | OR | Confidence intervals |
|----------------------------|------|----------------------|
| Male | 2.29 | 1.99 - 2.65 |
| Increased age (75-84) | 2.87 | 2.11 - 3.89 |
| Increased age (85 years +) | 3.87 | 2.79 - 5.37 |
| Mobility (chair-bound) | 2.39 | 1.90 - 3.00 |
| Mobility (bedbound) | 3.63 | 2.25 - 5.83 |
| Diabetes | 2.14 | 1.82 - 2.50 |
| Heart failure | 1.89 | 1.60 - 2.24 |
| PAOD | 7.40 | 5.70 - 9.60 |
| Infection | 3.02 | 2.58 - 3.54 |
| Control of swelling | 0.40 | 0.34 - 0.46 |

patients. She stressed that it has been important to explain to patients that information and photographs are not entirely secure. She directed patients and staff to do procedures virtually.

Christine Murphy's facility had already been piloting a virtual care model. She said that institutional barriers, such as the inability to accept photos from patients, limited the care staff could provide. One of the upsides, however, is that that patients appreciate being able to stay at home and receive care. Murphy's facility has found virtual care to be effective during the COVID-19 pandemic, especially since her facility was already prepared from the pilot project.

The second topic addressed was how to provide patient care through a virtual platform. Facilities vary on whether they accept photographs and secure transmission of patient information through virtual means. There are both asynchronous visits, in which patients submit a message or video and a physician responds at a later time, and synchronous visits, which involve both the patient and a health-care provider meeting together in the present time. The general guideline provided by Murphy is to read a script to the patient that outlines the potential risks and limitations.

Moderator Douglas Queen then asked which aspects of virtual care are preferable to in-person care. Laurie Parsons stated that the first visit should be in person and the follow-up can often be done at a distance, when home-care nurses can assist. Murphy also prefers to have an in-person

assessment. Virtual follow-ups can save the patient money that would be spent on travel, parking and accommodation. It is also valuable to include the home-care nurse, as they often know the patient well and can complete the necessary care. Champagne explained that there are several different applications that can be used for virtual care.

The panelists concluded by sharing advice for those wishing to use some type of proprietary system. Champagne advised those wishing to use such systems to first use a demo to understand the barriers and strengths of the application. Parsons would first ensure that each person uses an institutional or provincially approved application. Murphy encouraged the use of applications that are integrated with other systems. For instance, consider whether the application includes the necessary data and can be connected to other systems needed either in the present or future.

COMPLEX SURGICAL WOUNDS AND WOUND COMPLICATIONS: CASE DISCUSSIONS WITH THE EXPERTS

*Session speakers: John Hwang, MD FRCSC;
Alan Rogers, MBChB FC Plast Surg MMed FRCSI MSc;
Kylie Sandy-Hodgetts, PhD MBA BSc(Hons);
Kimberly LeBlanc, PhD MN BScN RN NSWOC WOCC(C)*

Kylie Sandy-Hodgetts discussed the International Surgical Wound Complications Advisory Panel



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(ISWCAP), surgical wounds and complications, and how to recognize risk factors for surgical wound complications. ISWCAP is a group of individuals who want to raise awareness of surgical wound complications. Such complications are a global issue that occur in all health-care settings. A surgical wound complication is a disruption to the normal wound healing process. The most commonly reported time frame for complications is between day 7 and 9 postoperatively but can be up to 90 days. Complications often occur after the patient has been discharged, highlighting the importance of community care. There are a number of factors that can be mitigated to prevent surgical wound complications, especially infection. The patient-centric model is especially important when considering ways to reduce risk.

Both preoperative and intraoperative settings have a diverse amount of published research indicating best practices for mitigating complications; however, there is yet to be a gold standard for the postoperative setting. Post-discharge surveillance is needed for complication detection. With a panel of experts, Sandy-Hodgetts created a surgical wound dehiscence grading tool. This tool can be found on [ISWCAP's website](#).

John Hwang discussed an approach to wounds from the perspective of general surgery. An initial wound assessment is important. This assessment should include a focused history and physical, thorough wound assessment, discussion of patient priorities and review of previous surgical reports. Following the assessment, local factors that might impair wound healing should be considered. These factors include foreign bodies, infection, ischemia and edema or elevated tissue pressure. Systemic factors that impair wound healing should also be considered. These factors can include older age, diabetes, obesity, hypothyroidism, immunosuppression and nutritional deficiencies, among many others.

Hwang then introduced the first case study. A 43-year-old male presented with a persistent draining sinus over 12 months from a prior inguinal hernia surgery that was complicated by infection. The patient had had the sinus incised and drained twice with recurrence. Hwang and his

team considered a repeat incision and drainage, negative pressure dressing, bovine submucosal plug, surgery and long-term antibiotics. The team chose surgery, as the infection was most likely due to an infected mesh. The mesh was completely removed.

The second case involved a 65-year-old male with stage 3 rectal adenocarcinoma. The patient was on neoadjuvant chemorads and had a perineal wound dehiscence after the staples were removed. The wound had drainage, with no odour, fever or erythema. In this case, Hwang and his team chose to refer to the plastic surgeon because the area was likely to be difficult to heal. The surgeon used a gracilis flap to enclose the wound surgically, and the patient was able to heal.

The third case featured a 35-year-old female who had a laparotomy for a bowel obstruction. A resection of the TI was completed for a discrete Crohn's stricture. A chronic draining sinus resulted and was confirmed by sinogram to be a fistula. The team chose to apply local wound care because it was an uncomplicated fistula that would likely close on its own.

The fourth case involved a 92-year-old female who had an emergency laparotomy for a bowel obstruction. The patient had a wound dehiscence after staples were removed. The patient had no signs of infection. The team chose a combination of interventions. A dietitian was consulted to ensure adequate nutrition. Geriatrics was consulted, and the wound was closed surgically.

The final case involved a 55-year-old female who underwent a coronary bypass for heart disease. She had a history of diabetes, Grave's disease and a prior neuroendocrine tumor. The patient's left leg saphenous vein harvest site opened when the staples were removed. The team chose to apply local wound care and a negative pressure dressing. There were no signs of infection. Hwang highlighted throughout these cases that it is important to take both a local and systematic outlook to cases.

Alan Rogers discussed the advantages of negative pressure wound therapy both in his own practice and broadly. In his own practice, Rogers

has used negative pressure therapy in combination with other interventions to heal vascular surgery wounds, dehiscence, a laparotomy wound with a fistula, an orthopedic wound resulting from an infected hematoma, and a stage 4 pressure ulcer with osteomyelitis. Negative pressure therapy drains exudate, reduces edema, contracts the wound edges and maintains a closed, warm and moist environment while reducing the bacterial load.

Barriers to practice change can include differing institutional and surgeon priorities, referring surgeon involvement and patient engagement. The solutions to overcoming these barriers include engagement with the team to develop a plan, creation of surgical teams who are ready to take ownership, having a plan B, commitment to the plan and perseverance through setbacks.

DIVERSE SKIN TONES: DIAGNOSTIC CHALLENGES AND TIPS FROM THE EXPERTS

Session speakers: Elizabeth Ayello, PhD MS ETN RN CWON FAAN; Joyce Black, PhD RN; Gary Sibbald, BSc MD PRCPC(Med, Derm) MACP FAAD Med FAPWCA DSc(Hons)

This session reviewed the signs of melanoma and aimed to introduce practical strategies and tools to diagnose skin lesions and impaired skin integrity across the spectrum of skin tones.

Elizabeth Ayello noted that melanocytes produce the melanin, which is transferred to epidermal cells. The accumulation of melanocytes results in the darkening of the skin. The relative colouration of the skin is determined by the melanin produced by the basal cells.

Gary Sibbald explained that the Fitzpatrick Scale is used for classifying skin. In the scale, there are six types of skin. Type one always burns and is very fair. Type two usually burns, is fair, and tans with difficulty. Type three is medium and can sometimes burn and tan. Type four is olive, rarely burns and easily tans. Type five is brown, very

Pressure Injuries- Detection Solutions to Overcome Barriers

Possible Assessment Tools

- 
SEM (sub-epidermal moisture) detector
Bailes-Jensen BM, McCreath HE, Palfan A. Subepidermal moisture detection of pressure induced tissue damage on the truck. The Pressure Ulcer Detection (PUD) study outcomes. Wound Repair Regeneration. 2017 May; 25(3): 502-511
- 
Ultrasound
Grap MJ, Burk RS, Lucas C et al. Use of high frequency ultrasound to detect changes in skin integrity: An image evaluation validation procedure. Intensive Crit Care Nurs. 2015, June; 31(3): 141-147.
Oliveira, A.L., Moore, Z., O'Connor, T. & Patton, D. Accuracy of ultrasound, thermography and subepidermal moisture in predicting pressure ulcers: a systematic review. Journal of Wound Care. 2017; 26(5): 199-215.
- 
Infrared Thermography/thermal imaging
Brooks JD, Farnie K, Lyder C, Burton C. Improving the detection of pressure ulcers using the TMI ImageMed system. Adv Skin Wound Care. 2011;24(1):19-24.
Faircliff KJ, Winkelman C, Rizkala A, Jones K. Using temperature of pressure-related intact discolored areas of skin to detect deep tissue injury: an observational, retrospective, correlational study. Ostomy Wound Manage. 2012; 58(8):20-31.
Koerner S, Adams, D, Harper SL, Black JM, Langemo DK. Use of thermal imaging to identify deep-tissue pressure injury on admission reduces clinical and financial burdens of hospital-acquired pressure injuries. Adv Skin Wound Care. 2019;32:312-20

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rarely burns and tans very easily. Type six is black, never burns and always tans. This scale is not absolute, as someone with darker skin who lives in Canada could visit the Caribbean and burn on their first day there.

Risk reduction and secondary prevention are important. Primary prevention involves identifying those most at risk. The incidence of skin lesions rapidly increases with age in women over 40 years old and is three times more likely in men over the age of 75. Exposure to ultraviolet light that results in a blistering burn doubles the risk. Blue eyes and red hair, types one to three on the Fitzpatrick Scale, are at the highest risk. Additionally, the number of nevi, history of dysplastic nevi and a history of melanoma are risk factors that can be identified.

Secondary prevention, or early detection, occurs when a suspicious lesion is identified. A derma-scope can be used to examine the abnormalities and pigment of the lesion. Additionally, the early complete excision with wide margins and a full thickness biopsy can be used. It is important to use the **ABCD** abbreviation when assessing possible melanoma

- A** = asymmetry of the lesion
- B** = border irregularity
- C** = colour; black is melanin, red is inflammation and white is regression
- D** = diameter

Melanomas can also be found in nails, where Hutchinson's sign (when the pigment advances either above or below the nail plate) can be present.

Ayello highlighted that it is important to differentiate incontinence-associated dermatitis and pressure injuries. It can be difficult to see erythema in darker skin tones so clinicians need other measures for detection. Possible tools in the literature include the sub-epidermal moisture detector, ultrasound and infrared thermography.

Joyce Black discussed how to stage pressure injuries, especially in Fitzpatrick types five and six. Stage one assesses for erythema. However, it is not always easy to identify in darker skin tones. Physical exam techniques can include moistening the skin to aid in visualization, palpating and asking about pain, and comparing colour to surrounding skin. Do not use racial or ethnic descriptors. Research has found that temperature assessment can also be helpful. Patients with a cooler centre and warmer borders had a higher risk of developing a deep tissue injury. Black stressed that assessment in patients with darker skin involves a deeper investigation.

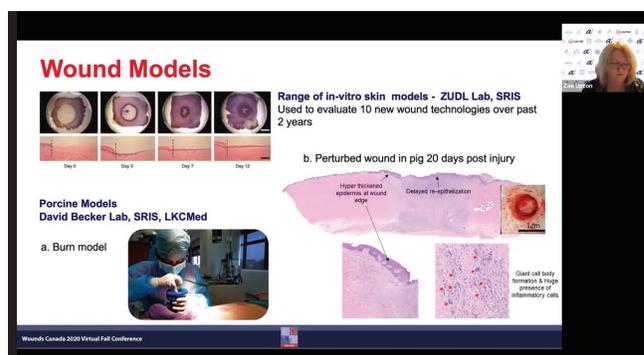
She also discussed the skin changes in patients with COVID-19. There is accelerated clotting associated with COVID-19, which can hasten the risk of ischemia. An early sign of COVID-19 are “COVID toes,” in which there is an embolic or ischemic presence in the toes. Once again, it is important to note the techniques that can be used to identify discolouration in diverse skin tones.

ADVANCES IN WOUND PREVENTION AND CARE: A GLOBAL SNAPSHOT

Session speakers: Douglas Queen, PhD MBA;
Zee Upton, PhD

Douglas Queen highlighted the global influence in wound care, where advances in wound care have occurred gradually.

Gary Sibbald is seen as the grandfather of Canadian wound care. There are various information influences such as Wounds Canada, Diabetic Foot Canada and NSWOCC. Canada has strong local and global influence.



In the United States, many groups led the way and introduced publications such as *Wound Repair and Regeneration* and *Advances in Skin and Wound Care*. Industry also plays a role in the United States through research and product development.

In the rest of the Americas, José Contreras-Ruiz and Manuel Gonzalez have contributed to advances in Mexico, where wound care is now fairly well developed, with support from a wound care association. In Brazil, Hermelinda Pedrosa and Vera Santos have been at the forefront of wound care. Brazil also has its own wound care societies embedded within other organizations.

South Africa has a fairly advanced wound care climate, led by Hiske Smart, Greg Weir and Frans Cronje. South Africa also has a wound healing association.

Australia has many wound care leaders, including Geoff Sussman, Zee Upton and Mike Woodward, along with several strong wound care organizations.

In India, wound care developments are mainly led by surgeons, including doctors Shukla and Pandey.

In the United Arab Emirates (UAE), doctors Tariq, Hamed and Hassan have contributed to wound care. The UAE also has a corporate wound care organization.

China has developed a research focus on wound care, especially in tissue regeneration and repair.

In Japan, an advanced clinical wound research focus has contributed significantly to data.

South Korea contributes much regionally and globally in the clinical practice setting.

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2. Camardo, Mark. "Veraflo Meta-Analysis Standardized and Non-Standardized Means.", 3M Internal Report, San Antonio, Texas, 2020.

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European countries have also contributed significantly over the years. Wound care is well advanced in Spain, which has multiple societies dedicated to wounds. Italy also has several associations and held the World Union (WUWHS) meeting in 2016. In Austria, Hugo Partsch is considered the grandfather of compression. Austria has both a wound association and journal. Germany has its own wound initiatives and a society. Denmark and Sweden also have both societies and a journal with a clinical focus. France and Ireland are similarly well advanced. George Winter and Keith Harding are both pioneers of wound care in the United Kingdom and globally. There are many journals and associations in the United Kingdom (UK), along with regional players. Europe in general has societies, associations and journals across the continent.

Focus on New Projects

Zee Upton highlighted wound care initiatives in Singapore, novel technological approaches being investigated and the benefits of collaborative interdisciplinary approaches to wound research. Through the creation of the Cooperative Research Centre (CRC) in Australia, in collaboration with other team members, Upton was able to convince the Australian government to take wounds seriously. The CRC also created many projects and publications and training for next generation wound researchers.

Upton joined the Skin Research Institute of Singapore. She and her team received funding for a project aimed at making Singapore a go-to hub for wound innovation. The project included partners from multiple disciplines and focused on enabling and evaluating technologies for wound healing and creating a large collection of wound data.

Another project focuses on the identification of wound biomarkers. Samples were taken from patients with diabetic foot ulcers and venous leg ulcers. This work builds on a dataset, where five biomarkers were identified in Australia. By the end of the year, there will be more than 250 samples from patients. Thus far, the team has found that there are 143 longitudinally significant pro-

teins between healing and non-healing wounds. Between five and nine of these proteins may be predictive biomarkers for wounds. Pathway analysis has also found that wound healing processes such as neutrophil degranulation and antimicrobial peptides are associated with the identified biomarkers.

In addition, novel diagnostic technologies to enhance healing for use in a range of clinical settings with a focus on primary care were investigated. A new 3D printing technology, keratin dressings made from hair, and microneedles for scars were some of the technologies researched. Clinically, Upton and her team have established a Singapore-wide multivariable wound registry and assessment of new imaging and diagnostic tools; they have also initiated trials of novel interventions.

SKIN FRAILTY: STRATEGIES TO PROMOTE SKIN HEALTH AND INJURY PREVENTION

Session speakers: Louise Forest-Lalande, RN Med NSWOC; Samantha Holloway, RN; Maja Williams, MScFN RD

The three speakers focused on interrelated areas of skin health and injury prevention. Louise Forest-Lalande spoke on skin health and injury prevention in the neonatal context. Samantha Holloway highlighted how both intrinsic and extrinsic factors can affect skin frailty, especially in older populations. Maja Williams discussed how nutrition and hydration play an important role in skin health and injury prevention.

The screenshot shows a presentation slide titled "Management of Skin Tears" from a video conference. The slide lists the following points:

- Application of a thin hydrocolloid that should remain on site for at least 24 hours
 - Up to 3 days
 - Daily observation
- If exudate is preventing adhesion:
 - Silicone-based foam dressing

There are two photographs of skin tears on the slide. The top photo shows a skin tear with a hydrocolloid dressing applied. The bottom photo shows a skin tear with a silicone-based foam dressing applied. The slide also includes a small video feed of a speaker in the top right corner and a footer that reads "Wounds Canada 2020 Virtual Fall Conference" and "CHU Sainte-Justine".

Neonatal Skin

Forest-Lalande discussed current and emerging strategies to promote neonatal skin health and prevent skin injury. In neonates, the skin has the same layers as adults; however, the thickness is only 60% of that of adults. Preterm neonates have fewer skin layers, depending on age. Skin is considered mature at 34 weeks of gestation, and the permeability will continue to decrease with age and will have good barrier function by 37 weeks. Preterm neonates' skin is more permeable and vulnerable to skin injury. Additionally, full-term neonate skin has an alkaline pH that will become acidic within the first four days of life. However, if the pH remains alkaline, the skin will be increasingly susceptible to micro-organisms.

Nursing care should aim to prevent disruption to the skin's acid mantle by using liquid cleansers that are neutral or mildly acidic. Forest-Lalande recommended avoiding products with alcohol or toxic substances and products that increase dressing adherence. Lukewarm water should be used instead of solvents. Adherent dressings should be left on for a minimum of 24 hours. More than 50% of pressure injuries in newborns are related to medical devices. Hydrocolloid strips can be applied when massaging the neonatal foot for a blood draw to prevent shearing of the skin. Chemical burns can be addressed with a silicone contact layer dressing and sterile gauze. Knowledge and education are the best means to prevent injuries to neonatal skin.

Elderly Skin

Holloway highlighted the importance of appropriate levels of nutrition and hydration in promoting skin health and preventing skin injury in older populations. Skin frailty can be triggered by several factors. As a person ages, skin becomes thinner, loses elasticity, has a reduced blood supply, loses subcutaneous fat and is less hydrated, and the dermo-epidermal junction changes. Additionally, radiation exposure, medications, dressings and repeated cleansing can impact skin frailty.

Both intrinsic and extrinsic factors contribute to skin damage. Extrinsic factors include environ-

mental hazards like sun exposure, cleansing or smoking. Intrinsic factors include aging and the effects of skin conditions.

Skin frailty can change, and individuals should be reassessed frequently. A comprehensive assessment should be completed when the patient first presents to the medical or clinical setting and then be integrated into a daily routine and documented. There is also evidence of a synergistic relationship between conditions, such as between pressure injuries and skin tears.

Moisturizing is also an important preventive mechanism for skin damage prevention. Moisturizing should be a part of a daily care routine for those at risk of damage. Other preventative mechanisms, such as reducing sun exposure, ensuring water temperatures are not too hot, patting the skin dry and managing continence, can help to reduce the risk of skin injuries.

It is important to take a holistic approach to skin care. The patient should be involved, and other areas of health, such as nutrition and hydration, should be considered. Barriers to the assessment and management of skin frailty should also be identified early to better understand and develop solutions.

Dietary Considerations

Williams highlighted the importance of nutrition and hydration in skin injury prevention. There are several risk factors for skin injury related to nutrition and hydration. Unintentional weight loss or low BMI, low protein and food intake, dehydration and iron deficiency anemia are some of the risk factors. It is important to assess the patient's nutritional and hydration status when they first present to the clinical setting. There are many screening tools health-care providers can use, such as Mini Nutritional Assessment (MNA), Malnutrition Universal Screening Tool (MUST) and Simplified Nutritional Appetite Questionnaire (SNAQ). The assessment should consider the patient's weight history, anthropometric measurements, biochemical data, physical assessment, adequacy for food and ability to eat independently. Medical management in conjunction with diet is ideal for skin health and fast recovery. 

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