

# Limb Preservation JOURNAL

**Inlow's 60-second  
Diabetic Foot Screen:  
Update 2022**

**Understanding Barriers and  
Solutions to the Delivery of  
Best Practices in  
Diabetes-related  
Foot and Wound Care**

**Decreasing the Incidence of  
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1. Kim PJ, Attinger CE, Constantine T, et al. Negative pressure wound therapy with instillation: International consensus guidelines update. *Int Wound J.* 2020 Feb;17(1):174-186. doi: 10.1111/iwj.13254. Epub 2019 Oct 30.
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Wounds Canada ([www.woundscanada.ca](http://www.woundscanada.ca)) is a non-profit organization dedicated to the advancement of wound prevention and care in Canada. Wounds Canada was formed in 1995 as the Canadian Association of Wound Care.

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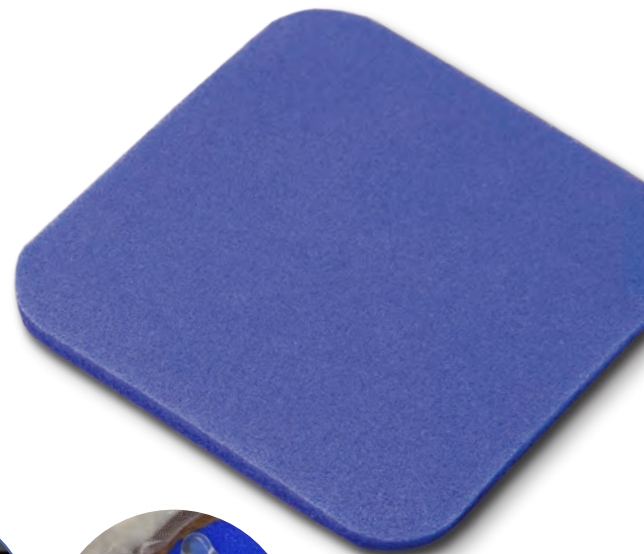
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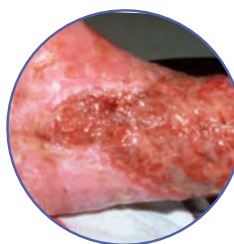
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# From the Editor- in-Chief

**D**ear colleagues,  
We are excited to share with you the latest issue of the *Limb Preservation Journal*. As the field of limb preservation continues to evolve, so have we. Many of you will have noticed that we have changed our title from *Limb Preservation in Canada* to the *Limb Preservation Journal*. This has been done in recognition that the challenges of limb preservation are global, and in response to what we feel is the distinct need for an international and interdisciplinary platform for limb preservation research, education and quality improvement.



We have also taken steps to enhance the integrity of our journal and the educational value of our articles by making them easier to locate and cite, through subtle layout changes and, most importantly, the inclusion of Digital Object Identifier – or DOI – numbers with each published manuscript.

The *Limb Preservation Journal* is proud to partner with Wounds Canada, the Canadian Podiatric Medical Association and D-Foot International to support clinicians and researchers in the field of wound care and limb preservation from around the world.

In this issue, and in future issues, you will find examples of original research, review articles, interviews, case studies and a recommended reading list of the latest research from the many diverse disciplines that work on amputation prevention. The diversity of the articles

included in this issue, with a bit of a focus on the vital aspect of education, is a testament to the incredible work being done in amputation prevention across different clinical disciplines.

As we move in this new direction, we will be reaching across the country and around the world and hope to engage experts from both the Canadian and international communities. To that end, I am pleased to welcome three new members to our Editorial Advisory Board. The first is Virginie Blanchette, a podiatrist PhD and Associate Professor at the Université du Québec à Trois-Rivières, Canada, who has been a regular contributor to our journal. The second is Joel Alleyne, Executive Director of the Canadian Podiatric Medical Association, who will add a valuable health informatics perspective. And finally, we welcome Dr. Zulfiqarali G. Abbas, an endocrinologist and diabetologist practising in Dar es Salaam, Tanzania who is currently the President-elect of D-Foot International.

We hope that you will enjoy this issue and reach out to us if you have any suggestions or if you are considering submitting to our journal. We would happily work with you to highlight your work.

Sincerely yours,

A handwritten signature in blue ink that reads "Ahmed Kayssi". The signature is fluid and cursive, with a large initial 'A'.

Ahmed Kayssi, MD MSc MPH FRCSC

# From our Partners



**T**he mission of D-Foot International is to end avoidable lower-limb amputations due to diabetes worldwide and promote the global profile of diabetic foot prevention and care through awareness, guidance, education, research and professional development.

D-Foot International is a non-profit organization that is committed to reducing the number of amputations caused by diabetic foot complications around the world. With an estimated 425 million people worldwide living with diabetes, D-Foot International is addressing a critical public health challenge.

One of D-Foot International's top priorities is to promote awareness and education about diabetic foot complications. We believe that education is key to preventing diabetic foot problems and reducing the number of amputations. To achieve this goal, we provide valuable resources and training to health-care professionals, patients and the public.

D-Foot International also collaborates with health-care providers and policymakers around the world to improve diabetic foot care. We provide training and resources to health-care professionals to ensure they are equipped with the knowledge and skills necessary to provide effective diabetic foot care. D-Foot International also advocates for policies that prioritize diabetic foot care.

D-Foot International is a vital organization that is doing important work to improve the lives of people with diabetes worldwide. Our focus on education, research and collaboration with health-care providers and policymakers is essential for reducing the number of amputations caused by diabetic foot complications. We can all support these efforts by spreading awareness of the importance of proper diabetic foot care and by becoming a member. Together, we can make a difference in the lives of people with diabetes around the world.

## **Current Projects and Initiatives**

Our organization has identified several priority projects aimed at improving diabetic foot care globally:

- Train the Foot Trainer Project
- Webinars by Experts
- AB(b)A
- FLIRT-Bird: Footwear for LMIC
- D-Foot International Diabetic Foot Academy
- Health Economic and Cost Study

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## NEWS

### Train the Foot Trainer

In February, D-Foot International organized the 7th *Train the Foot Trainer* conference in Chennai, India (February 9-12, 2023).

The *Train the Foot Trainer* initiative is our main flagship project. Teaching foot experts how to train others in quality education goes a long way when it comes to significantly reducing the number of lower-limb amputations due to diabetes. The goal of this initiative is to train foot experts around the world on how to set up education programs for local primary care professionals and other foot specialists.

Each *Train the Foot Trainer* course trains up to 50 participants in foot care best practices, teaching methodology and how to set up a diabetic foot centre. Graduates then go out and train thousands of doctors and nurses in their own regions.



Limb preservation and diabetic foot care experts from around the world gathered at the 7th *Train the Foot Trainer* conference in Chennai, India earlier this year.

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## UPCOMING EVENTS

*Diabetic Foot Awareness Week: The 2023 Diabetic Foot Awareness Week*, November 7–14, is a fantastic opportunity to connect with key opinion leaders and their communities from around the world, gain access to cutting-edge education and clinical

research, and make valuable connections with other professionals in the field.

This is our second flagship project, aimed at creating awareness about the diabetic foot globally. It runs for eight days in November every year.

Don't miss out on this unique opportunity – visit <https://d-foot.org> for more information on how you can get involved today.

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## JOIN US

Joining D-Foot International is an excellent opportunity to be part of a global movement that is working towards the prevention and management of diabetic foot complications. By downloading the available resources, implementing the IWGDF guidelines in your regions, and participating in the November 2023 Global Awareness Campaign, you can make a real difference in the lives of people living with diabetes-related foot complications. To apply for membership, visit <https://d-foot.org/membership>

# From our Partners



The vision of the Canadian Podiatric Medical Association (CPMA) is to ensure that podiatrists across Canada are universally recognized as essential providers of foot and ankle care, and to work for a strong profession that contributes to the health of *all* Canadians.

CPMA advances and advocates for the specialty of podiatric medicine and surgery for the benefit of its members and the health of the public.

1.1. The goal of the Association is to effectively serve and provide guidance to its members and the podiatric medical profession in Canada and, through the profession, to serve the public and to provide the authoritative national voice for podiatrists in Canada.

1.2. The Association recognizes a particular responsibility to contribute to the development of national positions and standards related to podiatric medical practice, education, research, equipment, materials and personnel.

The CPMA promotes strong professional values, practices and standards, as well as enhanced public awareness of good lower-limb health. Accordingly, our shared values include integrity, civility and respect. We promote continuing education and

practice evidence-based care that is patient-centric. We work collaboratively as an integral part of the medical team, and inter-professionally with other health-care professionals.

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## NEWS

### Canadian Limb Preservation Centre Makes the News 1

The Zivot Limb Preservation Centre at the Peter Lougheed Hospital in Calgary, Alberta was recently featured in a televised feature on Canada's Global News network.

The program, entitled '*Calgary Specialized Medical Unit Saves Limbs and Lives*', offered viewers, "a rare glimpse behind the doors of one of the top specialized medical units in the country".

The Zivot Limb Preservation Centre and adjacent minor surgery clinic opened to patients in October 2016. The Centre primarily serves patients with diabetes and vascular disease who are

at risk of amputation of their feet or lower limbs. It is the only facility of its kind in Canada.

## Canadian Limb Preservation Centre... 2

The Zivot Limb Preservation Centre continues to draw positive media attention, also being the subject of a recent article in the *Calgary Sun*. The article details the story of John Lohnes, a Calgary-region man, who received access to quick surgical intervention at the Centre, something he credits with saving his leg.

Lohnes attended the Zivot Limb Preservation Centre for an infection in his foot that had grown out of control and found himself almost immediately in a surgery suite where he was operated on. Although Lohnes lost a heel in the procedure, he credits the quick action with preventing a more severe outcome.

In the *Sun* article, Lohnes is quoted as saying: "They told me if I went anywhere else with that, the leg would have been amputated below the knee right away, because it would take so much time." He subsequently spent five weeks in hospital and underwent a lengthy healing process but remains thankful he was able to access immediate care.

## Current Initiatives

The CPMA currently has a number of projects underway.

1. CPMA is strengthening its research posture, and is working to collect data on the efficacy of podiatric interventions and services.
2. CPMA continues to strengthen its relationship with other medical professionals.
3. An active participant in the International Federation of Podiatry
4. Active participation in D-Foot International in conjunction with Wounds Canada
5. Social Media awareness strategies for Foot Health Month are upcoming.

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## UPCOMING EVENTS

CPMA runs monthly webinars for podiatrists. You can join our mailing list by contacting [info@podiatrycanada.org](mailto:info@podiatrycanada.org)

*Annual convention of the Ordre des podiatres du Québec*: June 16-17, 2023 at the Delta Marriott Hotel in Sherbrooke, Quebec.

*The BCPMA Annual Scientific Seminar*: September 29-30, 2023 at the COAST Coal Harbour Hotel in Vancouver, BC. Please visit [www.PodiatryNorth.com](http://www.PodiatryNorth.com) for more details and information.

In addition, the CPMA will host an online conference in the fourth quarter of 2023. Details will be posted on [www.podiatrycanada.org](http://www.podiatrycanada.org)

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## JOIN US

The CPMA is a non-profit organization that was formed in 1926, and is dedicated to enhancing the profession of podiatry and providing a collective voice to government, industry and Canadians on your behalf.

To become a member of the CPMA, podiatrists must first be a member of their own provincial organization. If the province in which a podiatrist practices does not have an association, that member can apply directly to the CPMA.

Active membership may be granted to any podiatrist who is duly qualified as a Doctor of Podiatric Medicine (DPM.) or possesses a Bachelor of Science (Honours) in Podiatric Medicine (BSc Hons Podiatric Medicine) or a Bachelor of Science (Honours) in Podiatry (BSc Hons Podiatry) degree and is legally licensed to practice podiatric medicine in a province of Canada in which legislation exists relating to the practice of the profession of podiatric medicine and the licensing of podiatrists.

In addition to connecting you to colleagues across Canada, CPMA membership also provides a number of additional benefits. For more information visit [www.podiatrycanada.org/membership](http://www.podiatrycanada.org/membership)

# Education, Research Barriers and Solutions to the Implementation of Best Practice in Diabetes-related Foot Care, Footwear and Wound Care: A Qualitative Inquiry

**Janet L. Kuhnke**, RN BA BScN MSc NSWOC Dr Psych; **David H Keast**, MSc M, FCFP(LM); **Robyn Evans**, BSc MD CCFP, **Sue Rosenthal**, BA MA and **Jane McSwiggan**, MSc OT

**Abstract:** Clinicians providing diabetes-related skin and wound care face complex barriers associated with patients' access and funding for foot care and footwear. We sought to understand the barriers and solutions to the delivery of best practices in wound care.

**Key words:** *education, diabetes mellitus, foot care, footwear.*

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We conducted a qualitative survey study of clinician perceptions in Northern Manitoba and Ontario, Canada using a semi-structured question and an open-ended survey. We sought the perspectives of clinicians regarding barriers and solutions when providing foot care, footwear and wound care services related to diabetes. We framed this study within the Chronic Care Model. Study letters of information and Informed consent were provided. Participants (n=48) completed open-ended survey questions focused on diabetes services. Survey data was thematically analyzed to identify leading themes and meanings; no incentives were given for completion of the survey.

Participants were deeply concerned about the overall health of patients living with diabetes (diabetes status, blood pressure, nutrition choices, glycemic control, smoking) and indicated gaps in client, family/caregiver knowledge related to foot care and footwear that affected health decision-

making. Culturally relevant education was recommended related to foot care and footwear. In addition, participants: 1) emphasized the need for health-care professionals to be respectful, take time to study and understand the communities and peoples' knowledge, opinions, and cultural values in care settings in which they practice; 2) discussed the financial burden patients experience when they need preventative foot care and footwear services (lack of finances dedicated to foot care and footwear is further complicated when patients develop diabetes-related foot complications such as foot ulcers and complex Charcot foot) and 3) acknowledged the need for leadership from health-care organizations to support increased education on foot care and footwear, including implementation of diabetic foot screening.

Despite considerable progress in foot care, footwear and wound care related to persons living with diabetes mellitus, significant challenges remain. Health-care professionals are in key

roles to provide their experience and solutions to the delivery of services. Clinicians struggle to effectively deliver the care they know is necessary to support patients living with diabetes, and at risk of foot complications. Future care should include foot screening for risk stratification by front-line clinicians, funded foot care and footwear and culturally relevant, community-based education for patients and their families.

## Background

Diabetes mellitus (DM) prevalence in Canada is of significant concern. Eleven million (1 in 3 Canadians) have diabetes or prediabetes and 1.7 million persons have undiagnosed diabetes. The estimated prevalence for prediabetes over 20 years is projected to increase from 22.1% (2015) to 23.2% in 2025.<sup>1,2</sup> These statistics are concerning as they are associated with diabetes-related complications such as cardiovascular disease and hypertension, kidney disease, mental health issues, retinopathy, neuropathy, limb loss and premature death. Of these, diabetic foot ulcers are one of the most feared complications.<sup>3,4</sup> Individuals with foot ulcers (wounds) experience physiological changes (neuropathy, infection, reduced mobility, and possible amputation) and psychological issues related to stress, anxiety and depressive symptoms. These factors may further contribute to changes in employment status, leisure and family dynamics.<sup>5-9</sup>

It is estimated that 15–25% of people with diabetes will develop a foot ulceration in their lifetime.<sup>2</sup> The economic costs of diabetic foot ulcers or ulcer reoccurrence are well documented.<sup>10</sup> In Europe, the costs associated with the treatment of diabetic foot ulcers are estimated to be 10 billion Euros per year.<sup>11,12</sup> According to the American Diabetes Association, in the United States, the annual per-patient costs for patients with diabetic foot ulcers are approximately \$US 13,700.<sup>13</sup> In Canada, the estimated annual costs of diabetic foot ulcers are \$547 million.<sup>14</sup> One-third of amputations are conducted on persons with a reported diabetic foot ulcer (2011/2012 data)<sup>2</sup>; and the costs of amputations to health systems are 10 to 40 times greater than the

cost of implementing effective initiatives to prevent amputation.<sup>9</sup> Finally, persons undergoing amputation are at a high risk of mortality, greater than some cancers.<sup>11</sup>

## Prevention is the Cornerstone

The International Diabetes Federation (IDF, 2020) recommends that prevention of foot complications, foot ulcers and amputations is possible through preventative patient-centred/family education, conducting individualized patient risk assessments by a multidisciplinary team and through early and aggressive treatment and management of the identified risk factors.<sup>9</sup>

Diabetes Canada (2018) recommends self-management education and daily foot care and examination of the feet, legs and nails.<sup>2</sup> In Canada, when compared to other Commonwealth countries, only 52% of patients with DM received an annual professional foot exam in the previous year.<sup>15</sup> Though clinical practice recommendations exist related to foot care and footwear, there remain gaps in the implementation of these recommendations in clinical practice.<sup>2</sup>

For patients and caregivers, self-management education includes learning how to conduct a daily foot exam, carrying out daily foot care, knowing where and to whom to report any foot changes and understanding the need for professional foot care and fitted footwear.<sup>2</sup> For clinicians, a comprehensive foot examination includes assessment of structural abnormalities, peripheral arterial status and testing for the loss of protective sensation and the presence of neuropathy.<sup>2,9</sup>

## Study Aim

Understanding barriers and solutions to the delivery of foot care, footwear services and wound care from the perspective of health-care professionals is crucial. They can provide a realistic perspective of barriers and solutions. The goal of this study was to explore barriers and solutions to the delivery of foot care and footwear care from the perspective of health-care professionals who deliver this care as part of their role.

## Theoretical Framework

The theoretical framework guiding this study was the Chronic Care Model as it aims to improve health-care practices and health outcomes.<sup>2,16,17</sup>

## Method

A qualitative, descriptive survey approach was used as it aims to describe participants' experiences and everyday occurrences in practical terms.<sup>18-21</sup> Using this approach, health-care professionals' perspectives were sought while attending a regional wound care educative event focused on the prevention, assessment, treatment and management of diabetes-related wounds. Each workshop participant received a research Letter of Information and Informed Consent explaining the study and an open-ended survey they could voluntarily complete. In the survey, participants were asked to describe, in detail, barriers and solutions to the delivery of patient-centered foot care and footwear services in their practice setting. Key themes emerged from the rich data collected using thematic analysis.

**Sampling and recruitment:** Participants were recruited from a regional wound care conference (2018). The conference was focused on the prevention, assessment, treatment and management of diabetes-related skin and wound care issues. Conference participants were health-care professionals from a large Canadian city and from rural, remote and/or isolated communities.

**Data collection:** Participants were asked to describe barriers to the delivery of best practices in foot care and footwear, and to identify solutions to support the delivery of best practices in foot care and footwear. Prior to the study, the open-ended questions were piloted for feasibility by two experienced community-based foot care nurses.<sup>20,21</sup>

**Ethical considerations:** Ethical approval for the study was received from the Research Ethics Board at St. Lawrence College, Ontario. Informed consent was obtained. Workshop attendees did not have to participate, and they did not have to return the survey if they chose not to.

**Data analysis and rigour:** Following standard practice, the open-ended survey data was typed verbatim and checked for accuracy (NVivo V11). Data was reviewed and checked by a second researcher to ensure study data was true to survey descriptions. Responses and issues described by health professionals in private and non-private practice were similar and therefore thematically analyzed together. The survey data was coded and read several times and verified by a third researcher. Through thematic analysis relevant themes emerged.

**Study limitations:** This is a small sample of health-care professionals that practice across diverse settings.

## Results

A total of 48 participants returned the survey (48/130; 37% response rate - see Table 1). Survey participants were from Manitoba and Ontario and 23 participants identified as practicing in rural and remote care settings. They identified as registered nurses (24/48), nine had designation as a Foot Care Nurse (FCN)<sup>†</sup> or focused their education practice on diabetes care, or as a nurse specialized in wound, ostomy and continence care. As well, 14 practical nurses had FCN designation. Podiatrists (2/48), physiotherapists (2/48) and an occupational therapist were present (5 participants were undesignated). Thirteen participants self-identified as being in private practice. Upon reading the data, the researchers included the data from the private practice participants in the thematic analysis as their responses were the same as participants in non-private practice.

Participants' professional roles varied widely and were evenly distributed across health-care settings. Eleven (11/48) participants practised in acute care, 13 in long-term care and 23 practiced in home care/community wound treatment clinics, primary

<sup>†</sup>Foot Care Nurses: "At this time there is no certification process for nursing foot care in Canada that is recognized by provincial regulatory bodies. The Canadian Association of Foot Care Nurses (CAFCN) is in the process of developing national competencies, educational opportunities, and a certification process for foot care nurses across Canada." Source: CAFCN, 2019, para, 1.

**Table 1:** Participants and Professional Role

Practical Nurse (PN)	14	With Foot Care Nurse†, Coordinator Wound Care, Winnipeg Regional Health Authority, Canada Designation	11
		Speciality not identified	3
Registered Nurse (RN)	24	With Foot Care Nurse Designation	9
		Speciality not identified	8
	Additional Education / Expertise	Foot Care Nurse & Clinical Diabetic Educator	1
		RN & Staff Education focus	2
		RN & Clinical Diabetes Educator	1
		RN & Nurse Specialized in Wound, Ostomy & Continence	1
		RN & Patient Education focus	1
		RN with Wound Care focus	1
Foot Care Nurse with no PN / RN designation	5		
Physiotherapist	2		
Podiatrist	2		
Occupational Therapist	1	Education and Research focus	
Total	48		

health-care teams and rehabilitation units. Some participants worked in two care settings.

**Themes:** From the data analyzed six key themes emerged. The themes are presented with barriers and solutions as described by the participants. Findings are presented in a narrative summary and pertinent quotes are included.

### **THEME 1: FOCUS ON PATIENT HEALTH STATUS**

**Barriers:** Participants identified the initial triage or assessment of the patients' diabetes health status was their primary assessment foci. They were concerned about treatment and management of the patients' diabetes (glycemic control), blood pressure management, smoking status, risk of depression and nutrition choices. They shared that the assessment of a patient's foot care practice and footwear behaviours may be a lesser priority, initially. As well, factors affecting the patient's health such as poverty and homelessness, social isolation and lack of social supports were often overwhelming for the clinician. A participant

stated: "Some patients are all-consumed and focused on acquiring safe housing, accessing water, and generating an income, and that this precluded their attendance at diabetes health education sessions and caring for their feet" (Participant 7).

**Solutions:** Participants emphasized the role of consistent patient, family engagement and offered diabetes prevention events at the community level, including topics such as: blood pressure and blood glucose management, smoking awareness and nutrition sessions (presented by registered dietitians). Educative activities were identified as being empowering to the patient, family and community members. A participant stated: "The use of pamphlets and verbal education with patients encourages them to keep appointments – as well, ask about blood glucose results at every appointment and link to foot care, footwear" (Participant 8). Another noted that educative sessions: "engaged persons with diabetes by conducting foot care and footwear education presentations at the community level" (Participant 18).

Specifically, in the out-patient clinic setting, a participant recommended offering, “consistent and compassionate words of hope” and “encouraging words” (Participant 18), to encourage patients regarding their foot care and health related issues. Another participant stated, “Health professionals have to be aware of not labelling patients” (Participant 32), as this is identified as impeding the development of a trusting, professional relationship.

### **THEME 2: FOOT CARE AND FOOTWEAR EDUCATION IS A PRIORITY**

**Barriers:** Participants described patients as having knowledge deficits related to high blood glucose and neuropathy and foot range-of-motion and mobility and the importance of, “why preventative foot care and protective footwear” is needed (Participant 18). Participants described some patients as acquiring footwear and adhering to the recommended treatment plans. Yet not all patients who acquired footwear, were able to wear, or transition fully to the new footwear. Participants described patients as returning to their previous (non-professionally fitted) footwear. As well, patients were reported to not attend follow-up footwear appointments due to work schedules, cost of travel, and lack of a driver to take them to the appointment. As a result, participants believed this interrupted the opportunity to continue relevant footwear and foot education.

**Solutions:** Participants described the need for diabetes education sessions with a foot care and footwear focus. They recommended engaging community members living with diabetes to encourage and coach other patients. Participants believe that sharing personal success stories would be of benefit to community members. The use of positive verbal reinforcements was identified as encouraging patients to follow-up with foot care nurses and podiatry recommendations. A podiatrist recommended: “Increase foot education through public services advertisements, television, radio, internet and educate to increase awareness...make sure is it relevant to the community” (Participant 8). A practical nurse stated, “Encourage family members to participate

in education; spousal and family members are key supports to encourage and reinforce healthy foot care behaviours and healthy nutrition choices” (Participant 36).

### **THEME 3: FINANCIAL DEMANDS ON PATIENT AND FAMILY**

**Barriers:** Foot care nurses described scenarios where patients who initiated preventative foot care services were unable to sustain the cost of the service long-term due to limited personal finances. For example, a participant stated: “A patient may pay \$35.00 to \$45.00 for a foot and nail care visit once a year as that is what they can afford, though the person knows foot and nail care should be done approximately every six weeks” (Participant 11). For some patients, initiating preventative foot care or having protective footwear was prohibitive due to demands on personal and family incomes. Funding for foot and nail care and footwear were consistently identified as a significant barrier to proactively planning visits to podiatrists, and foot care nurses. In addition, patients incur costs related to fuel costs, parking fees, travel time and loss of work time, and these were identified as prohibiting patients’ attendance at follow-up appointments. Participants stated that financial issues were exacerbated when a foot ulcer developed as costs for offloading devices and footwear were not funded.

**Solutions:** Participants advocated for health-care systems to fund preventative foot care and footwear services. A registered nurse stated: “All patients with diabetes should have foot assessments, many need to have specialized foot care and footwear coverage; funding should accompany all new diabetes diagnoses. Expensive, yes, but probably more cost effective and financially prudent for health care in the long run, as more money is presently spent on treatment, surgery and rehabilitation” (Participant 20). The majority of participants stated that the need to immediately fund preventative foot care and footwear was crucial to prevent foot ulcers, and amputations. Participants called on all levels of government (federal, provincial, and territorial) to intervene.

#### **THEME 4: CULTURAL COMPETENCE**

**Barriers:** Participants identified health-care professionals' knowledge of cultural competence as wide ranging, and as a barrier to foot care in care settings. Participants identified that health professionals need to read, learn and engage in the communities and First Nation communities in which they practice. A practical nurse stated, "It takes time to understand the patient's cultural and community traditions as related to health, home and work life and I know this is hard for staff when they only visit the patient to look at their feet or shoes; but it is part of care for the patient and family" (Participant 11). A registered nurse stated, "Being culturally competent is necessary to build trust and credibility with individuals and communities, this is needed whether you live in that community or only work in that community" (Participant 18). A participant stated, "Professionals that fly in or visit communities for short work periods should be able to demonstrate cultural competence. They should be aware of the community traditions before they come to a rural or remote setting" (Participant 7).

**Solutions:** One participant stated that if, "health professionals demonstrated cultural competence patients might be more likely to participate in foot care and footwear recommendations" (Participant 9). For example, a registered nurse stated, "When trust and a respectful relationship is established over time, patients and families are more likely to travel to appointments and follow up with foot care and footwear recommendations as there is a trust-filled relationship in place" (Participant 32). In addition, a foot care nurse stated, "It takes time to understand the cultural context and work with patients around their cultural beliefs. Find out what the reasons(s) or phobias exist for why the patient or family do not attend education sessions, and work with the patient and family (Participant 17). Another stated, "Visit, revisit, with the patient, to find out what 'fits' with their preferences, and keep consistently educating at every visit, and promoting current education tools" (Participant 13).

#### **THEME 5: VALUING PREVENTATIVE CARE**

**Barriers:** Participants stated that health-care leaders do not value and prioritize foot care and footwear in the health-care system. A registered nurse with extensive wound care experience stated, "Prevention of diabetic foot complications is not a health-care system priority - our leaders do not identify this as an important issue, even when ulcers develop, they do not heed the concern" (Participant 4). In addition, a nurse stated, "We do not have support to complete diabetic foot screening and assessments, it is just not a team priority. When foot screening is not completed, the patient does not receive accompanying preventative education/support and this places the patient at increased risk for the development of foot ulcers" (Participant 14).

As well, a registered nurse in acute care stated, "Amputation prevention and limb salvage is not a priority, until the wound and limb are in a critical state and the patient is admitted to emergency and the critical care setting" (Participant 19).

**Solutions:** Participants identified the need for health-care leaders to prioritize preventative foot care and footwear services in all care settings. If valued through appropriate funding they identified a focus on the prevention of amputation that would lead to diabetes prevention, reduction of foot ulcers and amputation rates. They described the need for immediate funding of preventative foot care and footwear services for Canadians living with diabetes. As well, 15 (15/48) of the participants identified the urgent need for consistent and credible foot care and footwear education for health-care professionals in all care settings.

#### **THEME 6: COMMUNICATION AND ROLES WITHIN THE INTERDISCIPLINARY TEAM**

**Barriers:** Participants in several care settings were unclear as to who is responsible to provide basic diabetic foot care and education when no diabetes-related foot complications are evident (foot deformity, ulcers). Conflict and distrust among health-care professionals were described as interfering with building team relationships.

Participants described physicians in rural/remote Northern communities in 'fly-in' roles (short-term) as not having time to fully appreciate the patient's overall health status and plan-of-care. As well, participants stated the fly-in physician role is not structured to support long-term chronic disease management, or foot and wound assessments. Physicians were identified as lacking knowledge and assessment skills related to preventative diabetic foot care, footwear, and foot ulcer knowledge, though they are expected to conduct foot and wound assessments, make care decisions and initiate interprofessional referrals.

Access to endocrinologists and foot specialists in Northern communities is limited. Participants stated endocrinology clinic staff need to value screening and assessing patients' feet, as this demonstrates to the patient the importance of foot care and screening. Participants stated that not all staff are, "allowed to use computers as they are dedicated to physician use only"; as well, e-chart access varies, limiting the sharing of health information.

**Solutions:** Participants want clear policies and procedures as to when they can provide basic foot and nail care. They described tension between health-care professionals when having to decide if they could trim and file nails, versus cutting the nails of a person with diabetes. A registered nurse stated: "We could use telehealth to maximize foot and footwear screening and assessments; technology could be accessed and used by private and mainstream health-care providers to enrich patient assessments and build collaborative teams. This would help us determine the best professional to provide foot and nail care" (Participant 40).

Another recommended health-care teams: "Network with contacts in [their] area, use telehealth, develop related education and in-services for staff. Teach patients and their families and demonstrate teamwork. Develop referral forms for foot care nurses, and increase awareness for physicians, nurses, physiotherapy and occupational therapy regarding foot care and telehealth consultations" (Participant 15).

A participant identified that standardizing foot assessments for health-care providers would mitigate a lot of the stressors as to, "who is responsible to conduct the foot screening and assessment" (Participant 3). Another offered: "The responsibility for preventative foot care for persons with diabetes mellitus seems unclear, this can be improved. How can foot care nurses be expected to provide all foot care for all persons with diabetes? Nurses and personal support workers need to know if they can provide basic foot care as well" (Participant 42).

In regard to education, nurses and physicians described wanting credible, accessible diabetes foot related education (face-to-face, conferences, or online). They indicated that internal team conflicts were a challenge and that roles and responsibilities for the provision of preventative foot care could be clearer. Physicians were identified as needing diabetes education regarding the appropriate time to make foot care and footwear referrals. They indicated that foot care and footwear should be emphasized at all appointments conducted by physicians, endocrinologists, nurse practitioners, renal and ophthalmology clinics. For example, a nurse stated: "A client and family travelled overnight to see the speciality team and endocrinologist. The nurse had written a note and sent it with the patient and family to ask for a foot assessment and foot care and footwear referral. The patient was told this was not the job of this team. This response added to my distrust and disinterest of preventative foot care among us as team members" (Participant 9).

Finally, trust and respect between team members were identified as creating tension. Participants recommend physicians, especially in Northern communities, have basic foot care knowledge as well as online and telephone support for complex wounds/ulcers, foot care and footwear. Sharing of clinical data on patient charts was at time limited by computer access only designated for certain professionals. Participants indicated this contributed to lack of trust, respect and limited teamwork within the professional teams. Having equal access to patient e-charts would build trust and knowledge sharing. With the constant

rotation of physicians in and out of communities, shared technology access would mean patients do not have to, “tell their stories and medical history – over-and-over, as this is burdensome for the patient and their family” (Participant 14). Lastly: “Physicians need foot education and need to have the authority to write a physician’s order for foot care and footwear services to be covered – by completing a prescription” (Participant 42).

## Discussion

**1) Patient health status:** Diabetes affects people in almost all countries at all stages of economic and social development.<sup>22</sup> Of concern in Canada are the higher prevalence rates of diabetes in First Nations, Aboriginal, Métis and minority ethnic groups.<sup>2,10,23</sup> The chronic care model emphasizes the value of patient self-care behaviours; in turn, patient behaviour is affected by what the patient believes and how they view themselves. To support patients, health education and interventions must be culturally appropriate, individualized and should target self-care skills and include emotional support. Developing a partnership with the patient and provider supports discussion about the health issue, aids in defining clear and reasonable goals, setting priorities, and developing and monitoring patient progress.<sup>22</sup>

In this study, participants clearly identified that upon completion of a patient assessment, the patient’s health status remained their primary concern (i.e., diabetes status, glycemic control, depressive symptoms, blood pressure, nutrition, foot care and smoking status). Patients living with diabetes have a complex range of responsibilities. Patients’ health statuses may be complicated when unrecognized depression affects their ability to perform self-care foot care activities. As well, a patient’s self-efficacy, or belief that they can perform self-care activities, may be lowered.<sup>23,24</sup> Yet, when culturally-appropriate health education is offered, patients’ glycemic control, knowledge of diabetes and healthy lifestyle choices were shown to have short to medium improvements.<sup>25</sup>

Patients with a foot complication or ulcer do not necessarily seek foot care services, or access such

care in a timely manner.<sup>26</sup> Patients describe having limited foot education, competing priorities in life, being unable to perform self-care foot behaviours (daily foot exam) and varied awareness levels of diabetic foot complications.<sup>26</sup> Participants in this study did not comment on vision or inability to view the foot.<sup>2</sup> Overall, physical, social and mental health-related quality of life is affected when living with a foot ulcer.<sup>27-31</sup> Yekta and colleagues (2011), reported that patients who go on to develop a foot ulcer have lower health-related quality of life (physical and mental scores) than patients without a foot ulcer. For those with foot ulcers, low education levels, living alone and having at least one diabetes-related complication contributed to lower health-related quality of life.<sup>32</sup>

## **2) Foot care and footwear education is a priority:**

Closely linked to effective patient self-care is supportive foot care and footwear education. In the chronic care model, foot care and footwear education need to be embraced by professionals throughout the health-care system (leaders to frontline staff). Delivery of safe, high-quality care includes consistent communication through education programs for patients and families.<sup>22</sup> Education for persons with diabetes starts with prevention and includes strategies to mitigate risk and then manage foot and ulcer complications, as necessary.<sup>4</sup>

The cornerstone for the prevention of foot ulcers is daily foot examinations.<sup>4</sup> However, it is challenging to engage individuals in foot education if they have emotional or mental health issues such as diabetes distress, depressive symptoms, or depression; this is further challenged if patients have developed a foot ulcer and have wound treatments and infection management.

Participants in this study described patients and families as having knowledge deficits regarding foot care practices and footwear. For some patients, who initiate foot care, they do continue to seek preventative foot care and footwear long-term. Participants recommended community-based education by credible educators. Dorresteijn and colleagues (2014) reviewed 12 studies related to patient education and the prevention of diabetic

foot ulcers. Patients' foot care knowledge improved in the short term with some changes to self-reported, self-care behaviours. More research is needed in this important area of clinical practice.<sup>33</sup>

### 3) Financial demands on patient and family:

Participants in this study were deeply aware of the patients' financial burden of paying for foot care and footwear services. If diabetes-related foot complications resulted in a foot ulcer, this may interfere with a patient's ability to work and may impede their ability to pay for foot care and footwear services. Foot complications may impede patients' ability to obtain and maintain employment, especially if the patient needs to stand and complete a work day or specific task when wearing an offloading device.<sup>34</sup> Females with type 2 diabetes experience wage differences of almost 50% when compared to those without diabetes.<sup>34</sup> As well, patients with diabetes and foot neuropathy were reported to have increased use of sick time, and may prematurely retire. Family and caregivers may lose paid employment, and reduce volunteer activities, to take time out of their day to support the individuals with diabetes-complications.<sup>37</sup> Breton and colleagues (2013) (n=23 studies) studied increased absenteeism, reduced work productivity, and early retirement trends in persons with diabetes. Persons with diabetes had fatigue and higher than average absenteeism from work (0.9 to 5.7 days). When peripheral neuropathy was evident, persons were reported to be 52% more likely to lose  $\geq$  two hours of work time per week.<sup>37</sup> Similarly, Sylvia and colleagues (2012) explored the work limitations of employees with diabetes (n=385). Of the employees, 72% reported work limitations, changes to work hours, issues with mental/interpersonal health and reduced output. When the study data was corrected for gender, employment settings, response type and years in the program, those with high risk factors for diabetes were more likely to report overall work limitations.<sup>38</sup>

4) **Cultural competence:** Closely linked to patient health status and education was the theme of culture and traditions. Participants identified the

need for foot care and footwear professionals to study and demonstrate cultural competence. As part of competence, clinicians need to take time to understand the complexities of the culture and environment in which one practices. This takes time and building of trust. Therefore, this can be challenging when practitioners fly in and out, and do not know the community or do not develop relationships with individual patients and their families.

There is limited research regarding the experiences of First Nations (Indigenous) peoples affected by diabetes-related foot complications.<sup>40</sup> For Canadian First Nations, Aboriginal and Métis members, emotional health and illness are attributed to complex issues related to residential schools, socioeconomic issues, poverty, and loss of language and culture. Over time, this has contributed to emotional ill-health, including loss of identity, stress, anxiety, depression and post-traumatic stress disorders which in turn may interfere with one's ability to participate in preventive foot care behaviours and footwear.<sup>40</sup>

Some participants described completing health organization/agency e-modules or workshops about cultural competence.

5) **Valuing preventative care:** Participants described the need for more foot care and footwear education, as diabetic foot screening/assessments are not identified as a priority by some health teams and care providers. When foot assessments are not completed, the patient does not receive accompanying education, and may be placed at additional risk. In a recent quality improvement study, provision of staff education on diabetic foot screening improved clinician screening practices from 9% to 69%.<sup>41</sup>

### 6) Interdisciplinary team roles and communication:

Within teams, participants described a lack of trust and respect between professionals. Within the health-care systems they describe a lack of commitment to focus on diabetes foot care and footwear prevention and education. The chronic care model emphasizes a health-care system that is proactive, integrative, continuous and focused on the family and individuals living with the chronic disease.<sup>22</sup> In

a review of 12 studies, Baptista and colleagues (2016) recommend maximizing communication systems, technologies and communication between manager and service providers. When teams were involved in clinical-decision-support changes, health professionals were observed to change their behaviours. When making changes, clinical decisions should be made collaboratively.<sup>22</sup>

To effectively maximize the role of the chronic care model, multidimensional efforts must be designed, implemented and measured.<sup>17</sup> Prevention of complex foot ulcers requires that the health-care system acknowledge all elements of the chronic care model. Integrated teamwork is needed, and issues of power and communication must be addressed throughout the health-care system. More research is needed in this important area of health care.

## Summary

In this small study, participants shared the challenges of providing foot care and footwear services to patients in rural and small communities in Northern Manitoba and Ontario, Canada. Six key themes emerged from the rich data. Patient and family education that is based in the community, built on trust and mutual respect is recommended. To build this trust, health-care professionals must demonstrate cultural competence. The challenge of providers coming in and out of small remote communities added to the stress of reduced communication between the patient and provider, and within health-care teams. The financial burden incurred by patients who need preventative foot care and footwear services, may preclude patients from accessing short and long-term services. The study participants recommend that organizations and leaders embrace a preventative approach in which all health-care providers are responsible for discussing and supporting patients' efforts to prevent diabetes-related foot complications. The participants in this study provided rich data related to solutions to foot care and footwear issues. ■

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# Inlow's 60-second Diabetic Foot Screen: Update 2022

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**Abstract:** Eighty percent of lower extremity amputations related to diabetes-related foot disease can be prevented with the integration of prevention and interdisciplinary care, including screening, foot care and footwear education. In Canada, only half of persons with diabetes receive appropriate foot screening, and this estimate may be higher than the reality.

Wounds Canada has updated its diabetic foot screening tool, *Inlow's 60-second Diabetic Foot Screen (2022)* to increase its functionality and, ultimately, its usability in clinical practice. The new version was launched at workshops held at the 2022 Diabetes Canada and the Orthotics Prosthetics Canada national conferences.

For a person with diabetes, the screening results provide a risk level and identify direct associated educational activities and ongoing screening schedules. For clinicians and health-care organizations, the use of the diabetic foot screening tool in all care settings creates a common communication avenue between individuals and interdisciplinary teams supporting the individuals' foot care.

The methodology to update *Inlow's 60-second Diabetic Foot Screen*, including feedback from a primary care network and working experts, and alignment with the International Working Group on the Diabetic Foot (IWGDF) prevention guidelines, are presented in this manuscript.

**Key words:** *diabetes, foot risk screening, neuropathy, peripheral arterial disease, foot ulcers, amputations, interdisciplinary teams.*

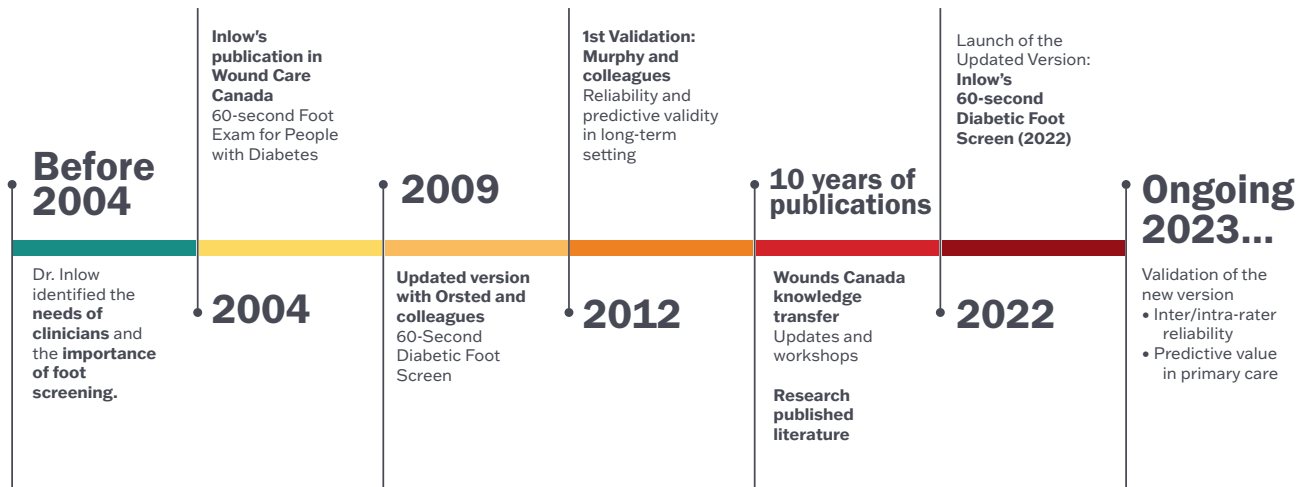
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**E**ighty percent of lower extremity amputations secondary to diabetes-related foot disease (see Diabetic Foot Disease Defined on page 23) can be prevented with the integration of prevention and interdisciplinary care, including foot screening, education and foot care.<sup>1-3</sup> Up to 34% of Canadians living with diabetes will develop a diabetic foot ulcer (DFU) in their lifetime.<sup>1</sup> Unfortunately, the rate of diabetes-related amputation is rising and associated care remains fragmented across Canada.<sup>4</sup> The impacts of amputation deeply touch the lives of the individuals and their

families and lead to increased use of health and social services.

The importance of conducting a diabetic foot screen for risk factors and stratification has been established in the literature.<sup>5</sup> The International Working Group on the Diabetic Foot (IWGDF) *Guidelines on the Prevention of Foot Ulcers in Persons with Diabetes* (2019 update) recommend screening and examination frequency in four categories: Very Low, Low, Moderate and High Risk.<sup>2</sup> This is important as in Canada only half of persons with diabetes receive appropriate foot screening, and this estimate may be higher than

**Figure 1:** Development Timeline of Inlow's 60-second Diabetic Foot Screen



documented.<sup>6</sup> In addition, we do not know if risk stratifications were used for those screened.

### Diabetic Foot Disease Defined

The term diabetic foot disease was used to encompass different conditions such as diabetic foot ulcer, neuropathy, Charcot neuroarthropathy and peripheral arterial disease; conditions likely to occur in people with diabetes.

Source: *The International Working Group on Diabetic Foot (IWGDF, 2020)*.

To avoid, or at least reduce complications, including major amputation and premature death, the identification of high risk in people with diabetes by early assessment seems to be a crucial action and some clinical tools have therefore been developed for this purpose.<sup>7</sup> *Inlow's 60-second Diabetic Foot Screen*<sup>8</sup> has garnered a great deal of attention over the years due to its ease of use, the rapid detection of high-risk diabetic feet and clear care planning actions for patients and clinicians to take based on risk category.<sup>9</sup> In addition, *Inlow's 60-second Diabetic Foot Screen* provides a systematic method that can be used by patients and clinicians for foot ulcer prevention and ongoing screening after an ulcer or complication occurs. As such, this evidence-based tool must evolve

to conform to best practices to ensure adequate knowledge transfer. Therefore, the objective is to describe the process undertaken to update *Inlow's 60-second Diabetic Foot Screen* and describe the new features and skills needed to support its use and implementation in clinical practice.

### Background

Before focusing on the 2022 update, it is necessary to review the history of the tool, which was originally developed by Dr. Shane Inlow (Calgary, Canada), a clinical expert in diabetic foot disease before his retirement. Because of his original contribution, the tool was named in his honour. Dr. Inlow was also very engaged with Wounds Canada.<sup>10</sup> The updated tool was



L to R: Virginie Blanchette, Shane Inlow, and Janet L Kuhnke in Calgary, Canada. (November 2022)

presented to Dr. Inlow in Calgary before its official launch.

The timeline related to *Inlow's 60-second Diabetic Foot Screen* is presented in Figure 1. Wounds Canada updated the tool in 2018<sup>11</sup> and a new update was a priority project in 2022. It was crucial to update this evidence-based tool and to align it with the updated scientific literature to conform to best practices and to ensure adequate knowledge transfer.<sup>12,13</sup>

Wounds Canada has conducted an update based on user needs. We first obtained feedback from a primary care network involved in diabetic foot screening (Seamless Care Optimizing the Patient Experience [SCOPE] Network), and they provided recommendations for change. Next, a working expert group, mainly the authors of this publication, was formed to collaboratively iterate on the feedback and latest evidence. The working group reviewed the comments and recommendations for change, as well as new literature, to align with the updated IWGDF prevention guideline that will be available in May 2023.<sup>2</sup> The updated version was launched at workshops held at the 2022 Diabetes Canada and the Orthotics Prosthetics Canada national conferences.

### Updated/Added in 2022

1. Updated risk screening and plan-of-care
2. Created fillable PDF version
3. Expanded demographic section
4. Clarified instructions and improved title
5. Incorporated self-reported risk factors and co-morbidities
6. Improved layout for each limb documentation
7. Removed critical ischemia (the tool does not diagnose this condition) and added pain
8. Incorporated a link to Diabetes Canada fitness and activities (under recommendations)
9. Added links to the relevant patient, caregiver, and clinician resources.

### 2022 Update: What's new?

The updated *Inlow's 60-second Diabetic Foot Screen* (2022) tool is presented in Figure 2. The

tool, available as a fillable PDF in French or English, is freely accessible via this [link](#). The tool has kept its three integrated steps leading to the identification of the risk to patients' feet and recommendations and actions to be taken accordingly. These key categories examined are the known risk factors involved in the pathophysiology of the development of a diabetic foot ulcer.<sup>2</sup>

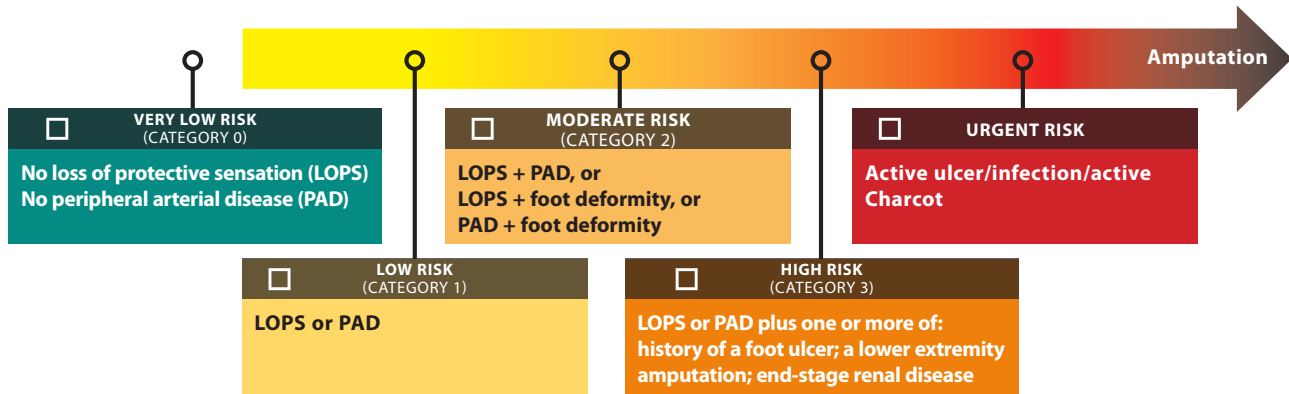
- **Step 1:** Complete the evaluation of both feet by assessing: 1) the skin of the foot and nail conditions; 2) for loss of protective sensation using a monofilament (following manufacturers' usage instructions); 3) for suspected peripheral arterial disease and 4) for foot deformities. Also ask the individual to self-report risk factors and comorbidities such as retinopathy, nephropathy, smoking, etc.
- **Step 2:** Determine the person's risk of diabetic foot ulcer. This is informed by the previous observations from the previous steps. The risk categories are Very Low, Low, Moderate, High and Urgent.
- **Step 3:** Based on the level identified in step 2, follow the recommendations and action plan. Adapt the care plan to respect the person's needs, values, cultural preferences, experience with trauma and ability to participate. Engage relevant caregivers, as needed, to support the person.

Moreover, the updated version has improved the layout and usability. A fillable PDF format was also developed. The instructions for each step were updated and simplified. We also added a patient identifier. Considering the important effect of certain risk factors on foot health, we decided to incorporate a self-reported risk factor section (Step 1) including retinopathy, nephropathy, poor glycemic management, cardiovascular disease, peripheral arterial disease and tobacco use.<sup>14</sup> This may assist clinicians in their decision-making, as these factors are well-known to contribute to the overall burden of diabetic foot disease and complications. Finally, we have aligned the risk stratification, recommendations, and actions with the IWGDF guidelines.<sup>2</sup>



## ► Step 2: Determine the Risk for Ulceration and Amputation

**Instructions:** Review the results from Inlow's 60-second Diabetic Foot Screen to identify parameters that put the patient at risk. \*Very low risk involves no loss of protective sensation, peripheral arterial disease or related comorbidities/risk factors. If comorbidities exist, consider increasing to Category 1.



## ► Step 3: Create a Plan of Care with Your Patient Based on Identified Risks

**Instructions:** Based on the risk classification and clinical indicators develop a plan of care with your patient that best meets their needs.

Risk Category	Clinical Indicators	Screening Frequency	Recommendations and Actions**
<b>Very Low Risk (Category 0)</b>	No loss of protective sensation (LOPS) and no peripheral arterial disease (PAD)	Screen every 12 months	<input type="checkbox"/> Education on: risk factors; daily foot inspection; appropriate footwear and foot- and nail-care;† when/how to seek medical attention if needed <input type="checkbox"/> Daily inspection of feet <input type="checkbox"/> Appropriate foot and nail care <input type="checkbox"/> Well-fitting footwear <input type="checkbox"/> Exercise as able
<b>Low Risk (Category 1)</b>	LOPS or PAD	Screen every 6–12 months	<input type="checkbox"/> Education on: risk factors (including LOPS or PAD); daily foot inspection; appropriate footwear and foot- and nail-care; when/how to seek medical attention if needed <input type="checkbox"/> Daily inspection of feet <input type="checkbox"/> Professional foot and nail care, including treatment of onychomycosis and Tinea pedis if present <input type="checkbox"/> Well-fitting, sensible footwear with custom, full-contact foot orthoses and diabetic socks <input type="checkbox"/> Vascular studies ± referral to a vascular investigation +/- vascular surgeon <input type="checkbox"/> Pain management for ischemic pain, if present <input type="checkbox"/> Referral to a rehab specialist to provide a plan for fitness (exercise prescription) based on risk factors
<b>Moderate Risk (Category 2)</b>	LOPS + PAD, or LOPS + foot deformity, or PAD + foot deformity	Screen every 3–6 months	<input type="checkbox"/> Education on: risk factors (including LOPS ± PAD ± foot deformity); daily foot inspection; appropriate footwear and foot- and nail-care; when/how to seek medical attention if needed <input type="checkbox"/> Daily inspection of feet <input type="checkbox"/> Professional foot and nail care, treatment of onychomycosis and Tinea pedis if present <input type="checkbox"/> Well-fitting, orthopaedic footwear with custom full-contact total contact casted foot orthoses and diabetic socks. Footwear must accommodate any deformities present <input type="checkbox"/> Vascular studies ± referral to a vascular surgeon <input type="checkbox"/> Pain management for ischemic or neuropathic pain <input type="checkbox"/> Referral to a general, orthopedic or foot surgeon, if indicated, surgically manage foot deformities <input type="checkbox"/> Recommend fitness and exercise program
<b>High Risk (Category 3)</b>	LOPS or PAD plus one or more of: • history of a foot ulcer • a lower extremity amputation • end-stage renal disease	Screen every 1–3 months	<input type="checkbox"/> Education on: risk factors (including LOPS ± PAD ± foot deformity); risk of ulcer recurrence; daily foot inspection; appropriate footwear and foot- and nail-care; when/how to seek medical attention if needed <input type="checkbox"/> Daily inspection of feet <input type="checkbox"/> Professional foot and nail care, including treatment of onychomycosis and Tinea pedis, if present <input type="checkbox"/> Well-fitting, orthopedic footwear with custom full-contact total contact casted foot orthoses and diabetic socks. Footwear must accommodate any deformities present <input type="checkbox"/> Modified footwear and/or prosthesis based on level of amputation <input type="checkbox"/> Vascular studies ± referral to a vascular surgeon <input type="checkbox"/> Pain management for ischemic or neuropathic pain <input type="checkbox"/> Referral to a rehab specialist to provide a plan for fitness (exercise prescription) based on risk factors
<b>Urgent Risk</b>	Active ulcer/infection/active Charcot	Urgent care required	<input type="checkbox"/> Education on: signs of wound infection and wound care; risk factors (LOPS ± PAD ± foot deformity); risk of ulcer recurrence; daily foot inspection; appropriate footwear and foot- and nail-care; when/how to seek medical attention <input type="checkbox"/> Daily inspection of feet <input type="checkbox"/> Professional foot and nail care, including treatment of onychomycosis and Tinea pedis, if present <input type="checkbox"/> Offloading with total contact cast, removable cast walker or wound shoe to close ulcers and/or to immobilize Charcot foot <input type="checkbox"/> Vascular studies ± referral to vascular surgeon or limb preservation clinic, as indicated <input type="checkbox"/> Pain management for ischemic pain or neuropathic pain <input type="checkbox"/> Referral to a general, orthopedic or foot surgeon, if indicated, to surgically manage foot deformities <input type="checkbox"/> Referral to infectious diseases to manage infection, if indicated, and/or to a general, orthopedic or foot surgeon to debride infectious tissue ± bone, if indicated

\*\* These recommendations and actions are not all-inclusive. Actions need to be customized to meet each patient's needs. Encourage patients (and caregivers) to manage their glycemic levels, triglycerides, weight, hypertension, and lifestyle choices such as smoking. Ensure the patient knows where to access professional assistance in the event of an urgent foot complication.

† Tools and educational materials are available online from Wounds Canada:

For patients (and caregivers): <https://dhfy.ca/for-patients-public>

For clinicians: <https://dhfy.ca/for-clinicians>

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In 2022, Wounds Canada released the *Foot Health Pathway for People Living with Diabetes* which integrates preventative foot screening.<sup>15</sup> The pathway takes a risk-based approach consistent with the population health model based on the quintuple aim framework which defines five components: enhanced patient experience, improved health outcomes, improved value to the health-care system, enhanced patient experiences and health equity.<sup>16,17</sup> This approach strongly supports person-centered and preventative approaches and upstream principles. Implementation of this approach should prevent individuals with diabetes from needing complex health and social care in the downstream services. The updated version of *Inlow's 60-second Diabetic Foot Screen* is aligned with the *Foot Health Pathway for People Living with Diabetes* and serves as an easy-to-use tool, allowing care providers to consistently examine and document foot-related issues with the ultimate goal of prevention of complications. Results of the screening inform risk stratification and the need for more specific care to be planned and implemented with the client. For clinicians and health-care organizations, use of the *Inlow's 60-second Diabetic Foot Screen* in all care settings creates a common communication avenue between the person and the interdisciplinary teams supporting the person's foot care, thus addressing issues related to health equity.

Wounds Canada is committed to transferring knowledge to action by facilitating *Inlow's 60-second Diabetic Foot Screen (2022)* tool use and implementation in real context settings. Thus, as a team, we will proceed to the inter- and intra- rater reliability validation, as well as to the evaluation of its predictive value in primary care. This validation will also allow us to better evaluate its implementation, along with barriers and facilitators, in a real context to support the community for its utilization. Wounds Canada will continue to train the community to use the tool in continuing professional development activities (please see:

Knowledge into Action: Preliminary Results of an Assessment of Clinicians' Intention to Use Inlow's 60-second Diabetic Foot Screen. *Limb Preservation Journal*. 2023;4(1): 30-36.

## Conclusion

Diabetes-related foot complications, such as foot ulcers and amputations, are often leading causes of morbidity in patients with diabetes. While many of these complications are preventable and manageable through early identification of risk and intervention, many patients with diabetes lack the awareness and education to recognize the importance of daily foot care, what to look for, and how to act when problems occur. Compounded with this challenge is the lack of timely consistent and coordinated delivery of health services. Implementing *Inlow's 60-second Diabetic Foot Screen (2022)* and the *Wounds Canada Diabetic Foot Health Pathway*<sup>15</sup> can assist clinicians and decision-makers to allocate resources that support a risk-based approach to support early risk assessment, plan of care and re-screening, re-assessment and evaluation of the interventions typically involved in each aspect of care. ■

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# Knowledge into Action: Preliminary Results of an Assessment of Clinicians' Intention to Use *Inlow's 60-second Diabetic Foot Screen*

Virginie Blanchette, PhD DPM; Alice T Wagenaar, BSc Kin, MSc, PhD (c) and Janet L Kuhnke, RN BA BScN MS NSWOC Dr Psych

**Abstract:** In 2022, Wounds Canada updated *Inlow's 60-second Diabetic Foot Screen tool* to increase its functionality and, ultimately, its ease of use in clinical practice. The new version was launched at a workshop held at the Diabetes Canada national conference in Calgary, Alberta in November 2022. As a part of continuing professional development (CPD) the workshop focused on the understanding of the importance and role of diabetic foot screening in the diabetes care setting, developing skills and knowledge about when and how to screen for diabetic foot disease and understanding how to implement the diabetic foot care pathway through use of the tool. CPD encompasses the multiple educational and developmental activities that health-care and social service professionals undertake to maintain and enhance their knowledge, skills, performance and relationships in the provision of health care and social services. Thus, as part of the processes we assessed the impact of CPD activities on participants' intentions to use *Inlow's 60-second Diabetic Foot Screen* after the workshop. These preliminary results illustrate the potential of using the CPD-REACTION tool, a theoretically validated questionnaire, in CPD activities for *Inlow's 60-second Diabetic Foot Screen*. This can improve its implementation, its scaling and ultimately its impact on clinical practice across all care settings and on population health.

**Key words:** *diabetic foot, risk assessment, behaviour, health-care personnel, patient care team.*

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## Context

It is the clinician's responsibility to conduct holistic diabetes related assessments, including assessment of the lower limb and foot. The importance of conducting a diabetic foot screen for risk factors and risk stratification is well established in the literature.<sup>1</sup> Early identification of patients at risk for diabetic foot ulcers should, therefore, be a priority as the burden of diabetic foot complications on the individual's quality of life, family, community and the costs to the health-care system are significant.<sup>2</sup> As well,

the advantages of foot screening outweigh any disadvantages.

*Inlow's 60-Second Diabetic Foot Screen* is relatively simple, accessible and should be widely used throughout clinical practice.<sup>3</sup> Yet, in Canada, only approximately 50% of persons with diabetes receive appropriate foot screening, and this estimate may be higher than documented.<sup>4</sup> When we compare this finding to the United Kingdom (UK), with a similar health-care system, we recognize that their diabetic foot screening level is about 80% of the population.<sup>5</sup> In addition, the

UK and Australia have established foot screening as an integral part of their national diabetic foot strategies.<sup>6,7</sup>

The Canadian Agency for Drugs and Technologies in Health (CADTH, 2016) published a report regarding the recommendations from nine evidence-based guidelines focused on foot screening and risk stratification.<sup>8</sup> This was important work as it supports the role of preventative screening to detect risk of foot ulceration and related complications. CADTH was aligned with another nine evidence-based guidelines to recommend the implementation of screening programs for diabetic foot ulcers, including risk stratification, patient education, pathways to specialized care and follow-up within the system.

However, Canada still has a discrete national strategy with only one component related to foot health: *Diabetes, Healthy Feet and You* – a Wounds Canada education program.<sup>9,10</sup> The recent announcement of an investment in research for the development of a national diabetes framework points to a promising future in terms of action against diabetes and its complication in Canada.<sup>11</sup> Foot screening programs need to be established across all health-care sectors. This is necessary to positively impact the lives of persons with diabetes and those at risk of foot ulcers and lower extremity amputations in Canada.

### **The Workshop: Illuminating the Path to Amputation Prevention for The Diabetes Healthcare Team - Screening and Beyond**

In 2022, Wounds Canada updated *Inlow's 60-second Diabetic Foot Screen* to increase its functionality and ease of use in clinical practice.<sup>12</sup> The new version was launched at a workshop held at the Diabetes Canada 2022 national conference. The focus of the workshop was to empower stakeholders, mainly clinicians, to utilize and embed *Inlow's 60-second Diabetic Foot Screen* in conjunction with the *Foot Health Pathway* in their clinical practice.<sup>13</sup>

We know that continuing professional development encompasses multiple educational

and developmental activities undertaken by health-care and social service professionals. CPD is purposeful as it seeks to maintain and enhance the knowledge, skills and performance behaviours of health-care professionals. Competency acquisition is a complex concept. To understand if workshop participants would use the new information they learned, we sought to measure their intention (intentionality) to use *Inlow's 60-second Diabetic Foot Screen* after the workshop. We also aimed to engage participants in reflective practice regarding their behavioural intentions to use this foot screening tool.

### **Process**

The authors conducted a 75-minute workshop at the Diabetes Canada national conference in Calgary, Canada (November, 2022). The learning objectives were to:

1. Understand the importance and role of diabetic foot screening in the diabetes care setting
2. Develop skills and knowledge about when and how to screen for diabetic foot disease (See *Diabetic Foot Disease Defined*, below)
3. Understand how to implement a diabetic foot care pathway.

The workshop included a theoretical content presentation, five interactive questions using *Mentimeter* software (Sweden) and two clinical case studies with demonstrations on foot models and correct use of a monofilament.<sup>14</sup> Handouts and post-workshop readings were provided. The last ten minutes were reserved for question and answers. This period of questions was extended by

#### **Diabetic Foot Disease Defined**

The term diabetic foot disease was used to encompass different conditions such as diabetic foot ulcer, neuropathy, Charcot neuroarthropathy and peripheral arterial disease; conditions likely to occur in people with diabetes.

Source: *The International Working Group on Diabetic Foot (IWGDF, 2020)*.<sup>15</sup>

20 minutes after the workshop to support learners' engagement. At the conclusion of the workshop, participants were invited to complete an online QR code-accessed questionnaire on a voluntary basis.

## How Do We Measure Intention?

CPD activities are an opportunity for clinicians to translate knowledge into practice. Thus, intent

to use *Inlow's 60-second Diabetic Foot Screen* tool is an indicator measuring the clinician's intent to conduct a foot screen and risk stratification. We measured participants' intention using the CDP-REACTION questionnaire.<sup>16</sup> This is a short, theory-based questionnaire that could be used as a tool to assess the impact of CPD activities on clinical practice.<sup>17</sup> The questionnaire incorporates three categories of variables that can predict the

behaviour of health-care professionals, such as those involved in diabetic foot screening.<sup>16</sup> Those variables include:

1. Intention to adopt or not adopt *Inlow's 60-second Diabetic Foot Screen*
2. Beliefs about their abilities
3. Past behaviours and habits.

The CDP-REACTION questionnaire, contains 12 questions, and was adapted to match *Inlow's 60-second Diabetic Foot Screen* as a targeted behaviour. The questionnaire was developed online using the *Qualdric* platform (*Qualdric* XM, United States). Results are presented in Table 2. We also included questions related to baseline participant characteristics, such as the province of practice, gender, main profession, years of experience and self-reported experience screening at-risk individuals with diabetes. The time required to complete the questionnaire was estimated to be five minutes.

We used the questionnaire as an extension of the face-to-face workshop and to engage participants in reflective practice specifically focused on three variables. We invited participants to direct their thinking toward *Inlow's 60-second Diabetic Foot Screen* through the questionnaire.

Finally, after verification with the ethics review board of the Université du Québec à Trois-Rivières, it was determined that ethics approval was not required to collect anonymous data with the questionnaire. Participants

**Table 1:** Baseline Characteristics

Characteristics (n= 16)	n (% approximately)
<b>Place of practice</b>	
Alberta	4 (25)
British Columbia	1 (6)
Prince Edward Island	0 (0)
Manitoba	5 (31)
New Brunswick	1 (6)
Nova Scotia	0 (0)
Ontario	4 (25)
Québec	0 (0)
Saskatchewan	0 (0)
Newfoundland and Labrador	0 (0)
Northwest Territories	1 (6)
Nunavut	0 (0)
Yukon	0 (0)
<b>Gender</b>	
Woman / Men	13 (81) / 3 (19)
Mean age in years (SD), [min-max]	48 (13), [23-66]
<b>Main profession</b>	
Nursing	13 (81)
Medicine	2 (13)
Other <sup>†</sup>	1 (6)
<b>Time in practice (in years)</b>	
Less than 2	2 (13)
2-5	1 (6)
6-10	2 (13)
11-15	3 (19)
16 and more	8 (50)
<b>At-risk patients with diabetes / week (self-reported estimates)</b>	
Mean patients (SD), [min-max]	21 (21), [1-50]

<sup>†</sup>Not specified, the person wrote "Diabetes Educator".

SD: Standard Deviation; [min-max]: [minimum-maximum]

were asked to provide consent at the beginning of the questionnaire.

### Measuring Intention: Preliminary Results

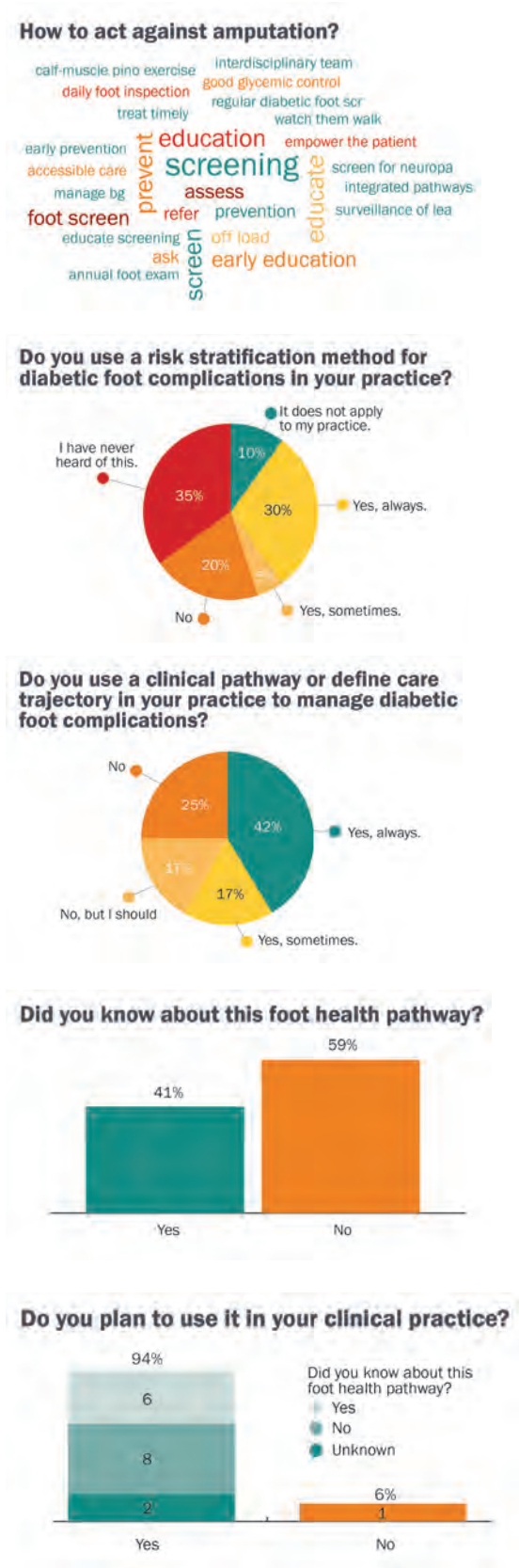
Approximately 45-50 participants attended the workshop. Sixteen participants completed the questionnaire. Baseline characteristics are presented in Table 1. Participants intention, social influences, beliefs about capabilities, moral norms and beliefs about the consequences of use of the *Inlow's 60-second Diabetic Foot Screen* are presented (see Table 2). Finally, five interactive workshop polling question results are presented in Figure 1.

Most respondents were women, primarily highly experienced nurses who see approximately 21 at-risk patients per week. Intention to use *Inlow's 60-second Diabetic Foot Screen* tool was relatively high among respondents (5.97/7). Most of the variables assessed were also rated high (above 6/7), namely social influence, belief in capabilities and belief about consequences. Only social influence was rated below 5 out of 7. With regard to the interactive polling questions, it is interesting to note that almost half of the respondents were not familiar with, or did not use, the screening tool. However, almost 50% were using a foot health pathway integrating stratification. Almost all participants plan to use the Wounds Canada *Foot Health Pathway* to guide their practice.<sup>13</sup>

### Discussion

Preliminary results support the potential use of the CPD-REACTION questionnaire in limb preservation CPD activities. This is an innovative aspect of our workshop that can be replicated elsewhere in training activities. To our knowledge, this is the first research initiative that measured the intention of clinicians regarding diabetic foot screening and the risk stratification behaviour of health-care professionals.<sup>17</sup> CPD-REACTION scores were high after our workshop, especially regarding the intention to use *Inlow's 60-second Diabetic Foot Screen*. While there is no definitive threshold for a clinically significant intention score in the literature, a score  $\geq 4$  can be considered

Figure 1: Results from interactive polling questions†



†Sample size varying between 12 and 20 respondents.

**Table 2:** Preliminary results from the survey (n=16)

Construct Scale	Questions	Response's choices	Score per question mean (SD)	Score per construct
Intention	I intend to use the <i>Inlow's 60-second Diabetic Foot Screen</i> in my practice.	Likert Scale with 7 choices between strongly disagree (1) and agree (7)	5.81 (2.01)	5.97
	I plan to use <i>Inlow's 60-second Diabetic Foot Screen</i> in my practice.	Likert Scale with 7 choices between strongly disagree (1) and agree (7)	6.13 (1.58)	
Social Influence	To the best of my knowledge, the percentage of my colleagues who use <i>Inlow's 60-second Diabetic Foot Screen</i> tool in their practice is:	5 choices: 0-20% 21-40% 41-60% 61-80% 81-100%	0-20%: 6 21-40%: 3 41-60%: 0 61-80%:4 81-100%: 3  3.76	5.21
	Now think about a co-worker whom you respect as a professional. In your opinion, does he/she use <i>Inlow's 60-second Diabetic Foot Screen</i> tool?	Likert Scale with 7 choices between never (1) and always (7)	7.75(4.59)	
	Most people who are important to me in my profession use the <i>Inlow's 60-second Diabetic Foot Screen</i> tool in their practice, if applicable.	Likert Scale with 7 choices between strongly disagree (1) and agree (7)	4.13 (1.69)	
Belief about capabilities	I am confident that I could use <i>Inlow's 60-second Diabetic Foot Screen</i> tool in my practice if I wanted to.	Likert Scale with 7 choices between strongly disagree (1) and agree (7)	6.19 (1.55)	6.19
	For me, using <i>Inlow's 60-second Diabetic Foot Screen</i> tool in my practice would be [choose difficulty level].	Likert Scale with 7 choices between extremely difficult (1) and easy (7)	6.19 (1.47)	
	I have the ability to use <i>Inlow's 60-second Diabetic Foot Screen</i> tool in my practice.	Likert Scale with 7 choices between strongly disagree (1) and agree (7)	6.00 (1.41)	
Moral Norm	Using <i>Inlow's 60-second Diabetic Foot Screen</i> tool is the ethical thing to do.	Likert Scale with 7 choices between strongly disagree (1) and agree (7)	6.19 (1.55)	6.34
	It is acceptable to use <i>Inlow's 60-second Diabetic Foot Screen</i> tool in my practice.	Likert Scale with 7 choices between strongly disagree (1) and agree (7)	6.50 (1.46)	
Belief about consequences	Overall, I think that for me the use of <i>Inlow's 60-second Diabetic Foot Screen</i> tool in my practice would be [choose utility level]	Likert Scale with 7 choices between useless (1) and useful (7)	6.81 (0.53)	6.71
	Overall, I think that for me using <i>Inlow's 60-second Diabetic Foot Screen</i> tool in my practice would be: [choose consequence level].	Likert Scale with 7 choices between harmful (1) and beneficial (7)	6.61 (0.23)	

sufficient to assume that a health-care professional has the potential to use *Inlow's 60-second Diabetic Foot Screen*.<sup>18</sup>

Our findings, although limited by a small sample were consistent with those of other post-CPD activities, except for the score related to beliefs about consequences, where we had a much higher score.<sup>17</sup> This may be due to the fact that *Inlow's 60-second Diabetic Foot Screen* is a tool primarily developed in Canada, and even if foot screening is not a widespread practice, respondents were very experienced regarding diabetic foot disease.<sup>4</sup> However, only about 35% of respondents were already practicing diabetic foot screening in their clinical settings (see Figure 1). We also knew the participants were not representative of the Canadian population and were not ideally diverse in terms of professionals likely to screen for diabetic foot diseases. In addition, this was not a research project with strong internal validity, and the scores must be interpreted with caution.

We also assessed our results in relation to the *Theory of Planned Behavior*,<sup>19</sup> as it is the foundation of the CPD-REACTION questionnaire. This includes seeking to understand the complexities surrounding desired behaviour changes as being primarily at the individual level. The goal is to convince health-care providers to consider diabetic foot screening as a viable intervention to act against diabetic foot complications, such as foot ulcers and amputations. Thereafter, foot screening and risk stratification could then be more easily implemented within organizations, with sound policy and procedures framing the implementation and measurement of outcomes. Strong policy also supports health-care providers to utilize screening tools.

Finally, *The Theory of Planned Behavior*<sup>19</sup> states that behavioural intentions are guided by attitudes toward the behaviour, subjective peer norms, and perceived behavioural control, with implementation interventions to address each construct.<sup>20</sup> The use of this theory has been frequently linked to effectiveness in systematic reviews of behavioural change interventions when translating knowledge into practice.<sup>21,22</sup> In addition, implementation intention or the

intention to use evidence (diabetic foot screen) has been shown to be effective in promoting healthy behaviours and leading to the implementation of evidence-based interventions.<sup>23,24</sup>

## Conclusion

These preliminary results are of particular interest in increasing the implementation of diabetic foot screening in clinical practice. CPD-REACTION can be used in a larger-scale study to identify barriers and facilitators to health-care professional behavioural change, and this type of data holds promise for implementing foot screening and risk stratification as the national level.

We have achieved our goal of transferring knowledge to participants by asking them to reflect on the different variables included in the questionnaire related to *Inlow's 60-second Diabetic Foot Screen*.

This project also demonstrates a concrete example of how education such as CPD activities can be combined with research focused on implementation science seeking to improve transfer of knowledge to clinical practice. Readers are free to use the CPD-REACTION questionnaire to reflect on their own foot screening practice and to integrate it into their organizations.

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## Conflict of interest

Virginie Blanchette is a member of the Wounds Canada Board of Directors. Alice T Wagenaar reports no conflict of interest. Janet L Kuhnke is a nurse researcher with Wounds Canada and Cape Breton University. ■

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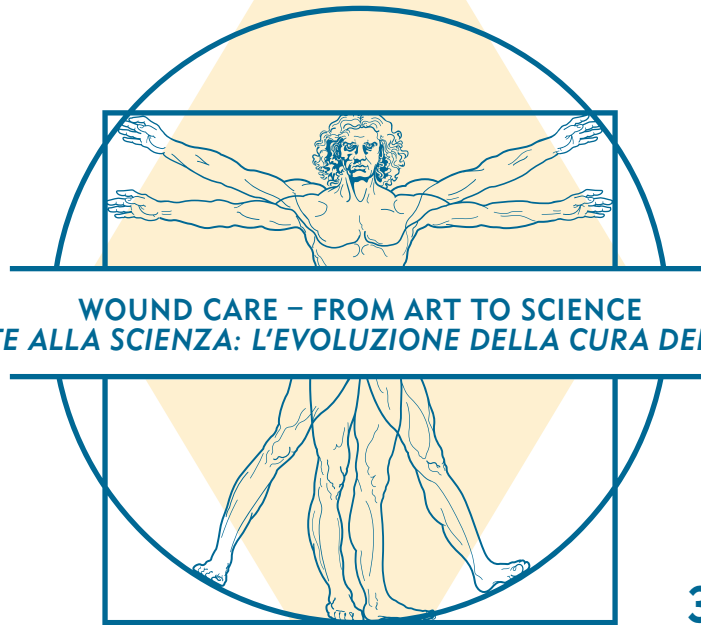
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# A Quality Improvement Initiative to Decrease the Incidence of Post-operative Wound Complications Following Minor Level Amputations

**Sindiswa Ntloko**, MBChB; **Amanda Mayo**, MD MHS Sc FRCPC; **Anastasia Derbakova**, BSc MS cPT and **Ahmed Kayssi\***, MD MSc MPH CWSP FRCSC FACS

**Abstract:** Patient education is important for improving the ability to manage one's health and optimize clinical outcomes. We identified a paucity in educational materials for patients who undergo a partial foot amputation at our institution (Sunnybrook Health Sciences Centre, Toronto, Canada) and developed an educational brochure to address this deficit as part of a quality improvement initiative. Our aim was to increase the proportion of patients receiving pre-operative education and improve the preparation of vascular surgery patients who will undergo partial foot amputations. We produced an educational brochure to improve patient knowledge and address any preoperative concerns. The effectiveness of this educational material was assessed with a questionnaire in a cohort of patients followed since January 2023. One Plan-Do-Study-Act (PDSA) cycle has been completed thus far. To date, five patients have completed the questionnaire. Three patients provided verbal responses. Sixty-six percent of patients found that the information in the brochure improved their knowledge and that the language of the brochure was easy to understand. Seventy-five percent of patients were confident with caring for their wound in the post-operative period. Educational materials are an important pillar of patient care, particularly in helping to prepare patients for minor amputations where there is a high failure rate and conversion to major amputations. Our brochure was effective in improving patient awareness and knowledge before surgery.

**Key words:** *amputation, foot care, patient education.*

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Lower extremity amputations (LEA) are a traumatic and often unexpected event in a patient's life that can lead to a loss of function, decline in quality of life and even death.<sup>1</sup> In an effort to spare patients from undergoing an amputation of the entire leg, surgeons will sometimes perform partial foot amputations (PFA), in which only part of the foot is amputated. PFAs are considered limb sparing procedures and are commonly performed to preserve ambulation. However, PFA may result

in complications, such as poor wound healing, and patients may still require a subsequent major amputation below or above the knee. Zhang et al.<sup>2</sup> highlighted the first two months following a transmetatarsal amputation (TMA) as significant given that 77% of subsequent major amputations occur in that period. This reiterates the importance of vigilant post-operative care and follow-up in patients having undergone a PFA. Kayssi et al.<sup>3</sup> showed the rate of re-amputations following foot amputations to be 14% with

an estimated annual rate of LEA above 1000. The study found that the province of Ontario harboured the highest incidence of LEA, as 53% of major amputations in Canada occurred in Ontario.

The impetus for this quality improvement (QI) project was an increased frequency of wound complications following PFA in our cohort of vascular surgery patients. In our gap analysis, we found a paucity of educational material and pre-operative preparation for patients that undergo PFA. Results of a 2020 *'Patient Preparedness for Surgery'* survey, which formed part of an ongoing QI project by co-author A. Derbakova, recommended that patients would benefit from pre-operative information in the form of a pamphlet. A prehabilitation clinic, located at the Sunnybrook Centre for Independent Living (SCIL), has been established, but not all patients have been accessing it to prepare for surgery and receive education. As part of a patient education initiative, our department embarked on creating a patient resource in the form of an 8-panel brochure to improve the knowledge, expectations, and post-operative strategies to optimize patient recovery following PFA.

Our aim statement was to increase the percentage of pre-operative education and preparation given to vascular surgery patients regarding their minor level amputation by 50% by June 2023.

## Methods

The QI project was registered with our institution (Sunnybrook Health Sciences Centre, Toronto, Canada) in January, 2023 under the registration number 199. Research ethics review was not required as this was a quality improvement initiative. A grant from our hospital's *Patient & Family Education Fund* was awarded to our team to facilitate this work.

Working in collaboration with the communications and design team, a brochure titled *'What You Need to Know After Partial Foot Amputation'* was developed (Appendix 1). The first draft was submitted to the design team in December 2022. From January 2023, patients

with a PFA who were seen, either at our hospital's prehabilitation clinic or in the ward were provided with a draft of the brochure. They were asked to read it and complete a questionnaire thereafter.

The questionnaire assessed three aspects:

- Preparedness for partial foot amputation prior to surgery
- Effectiveness of the brochure
- Preparedness for recovery following the amputation.

**The family of measures:** Our outcome measure was the number of patients obtaining the education material prior to their minor level amputation. We had two process measures; the first being the proportion of patients who were confident with their post-operative wound care and follow-up plan. The second process measure was the proportion of patients calling for assistance or presenting to our emergency department with wound infections. The balancing measures were the percentage of patients who did not obtain pre-operative education.

To date, one PDSA cycle has been completed. The patient questionnaire has been useful in obtaining qualitative data on the educational impact of the brochure.

## Results

Five patients have completed the questionnaire and there were three verbal discussions. The results are presented in the following categories:

A): *Patient preparedness for surgery:* Three patients completed this portion. Out of those, two said that they felt very well prepared and one felt moderately prepared for what to expect post-amputation. All three patients indicated that they consistently used their special footwear and mobility devices. One patient said he did not use his mobility device as he felt too weak to ambulate with his non-amputated leg.

B) *Effectiveness of the brochure:* Three patients responded to this section. Two patients found that the information and language of the brochure greatly improved their understanding. The one

patient who found the brochure to be ineffective stated that it was because he received the brochure after the surgery.

C) *Post operative care:* Four patients responded to this section. Out of the four, three stated they were confident in their knowledge of the wound care required during the post-operative period. Responses varied with regards to confidence in initiating walking in the post-operative period. Two out of four said they were confident, one was indifferent and one was not confident at all.

### Analyzing the results

Overall, patients felt that they were adequately prepared for their PFA as evidenced by the 66% (2/3) who felt very well prepared and the 33% who felt moderately prepared. There was no explanation provided by the patient who felt less prepared.

Sixty six percent (66%) of patients found that the information in the brochure improved their knowledge, and that the language was easy to understand. The patient who did not find the brochure effective said that it was because he received it after his amputation.

Seventy five percent (75%) of patients were confident with how to care for their wounds in the post-operative period. However, only one patient (25%) was confident with initiating walking after the partial foot amputation.

One patient recommended that a dedicated chiropodist at the institution would be of great assistance and another suggested information on phantom pain should be included in the brochure.

### Discussion

Health literacy is defined as the capacity to seek, understand and act on health information.<sup>4</sup>

Patient education and engagement are important in improving their ability to manage their health and improve their health outcomes. Studies have shown how education enhances health seeking behaviour and understanding. A publication by Paterick et al. places the primary responsibility of this literacy on physicians as they determine the parameters of the health interaction.<sup>5</sup> Our

results demonstrate the appreciation patients have when they are armed with information. The single patient who did not find the brochure as useful was nonetheless satisfied with the pre-operative counselling obtained during his consultation. A challenge we encountered in early phases of the QI was reaching our intended targeted cohort as we have been encountering patients in the post-operative period. Having completed the editing process of the brochure, we now have a printed version that we aim to distribute with the assistance of our administrative staff.

In our next PDSA, we will develop separate questionnaires to include patients encountered either pre-operatively or post operatively.

Another significant finding in our study related to patients' lack of understanding of the timing of initiating mobilization following the PFA. Some research demonstrated that 35% of patients regain pre-illness mobility after one year of having undergone a PFA. In the effort of minimizing this in our population, we endeavour to interrogate this uncertainty.

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### Conclusion

Lower limb preservation is an important hospital and health-care system priority. We have found that patient education remains an invaluable tool and we will continue to optimize our printed resources for patient benefit.

Potential conflicts of interest: None ■

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# What you need to know After Partial Foot Amputation



## How to Take Care of Your Wound

The look of your incision will get better over time. You may have swelling, redness, bruising or itching during the first few weeks after your surgery. The wound can take many months to heal completely.



### Use bandages or dressings.

Follow the instructions from your doctor and community care nurse about when to take off your bandages. When you need to change your bandages, clean your hands and wear sterile gloves to help prevent an infection.

**Keep your bandages dry.** You may shower but **do not** take baths or soak your foot until the incisions are fully healed. Use unscented soaps to make sure you do not irritate the incision. After you shower, gently pat your incisions dry with a clean towel. Do not scrub the incision.



### Check your foot daily.

Use a hand mirror to look at areas that are difficult for reach. Contact your doctor if you notice your wounds are getting worse or do not heal.



### Get your stitches removed.

Your surgeon will tell you when your stitches can be taken out. Stitches are usually taken out by your doctor or nurse in 3-4 weeks after surgery.

## Introduction

During partial foot amputation surgery, your toes or parts of your foot were removed. You may have needed an amputation because of gangrene, serious wounds, infection, or injury. The level of amputation was determined by the cause and severity of your condition. Our goal was to remove the part of your foot that was affected and keep as much function in your foot and ankle as possible.

We know this may be a stressful time for you and you will get a lot of information about your health. Use this booklet to help you keep track of what you need to do after your surgery.

### When should I get medical help?



Contact your family doctor or go to the nearest emergency department right away if you notice any of these symptoms:

- Your wound bleeds, separates, or you see yellow or green pus
- You have a fever of 39 degrees Celsius (100 degrees Fahrenheit) or higher for more than 24 hours
- You have flu-like symptoms, such as nausea, vomiting, and chills
- Your foot turns pale or blue in colour and is cold to touch
- Your pain does not get better, and your medication is not helping
- You have sudden severe pain in your chest, calf or back of the knee
- It is difficult to breathe

## Walking

It is very important to move after surgery. This can help prevent pneumonia, blood clots in the legs, and muscle weakness or stiffness.

After your amputation, your balance, strength and stability may be weaker. This is normal and will get better with time and exercise. Your health-care team will work with you to improve your mobility after your surgery.

### Footwear and Walking Aids

You may need crutches, a walker, and special footwear like an off-loading sandal or aircast boot to help you during your recovery. **Wear your special footwear every time you stand or walk and whenever your foot touches the ground.**

After your wound heals, you may also need custom footwear or orthotics. Your health-care team will talk to you about the right footwear to help prevent new wounds or damage to your feet in the future.

### Swelling

Some swelling in your affected foot is normal as you heal. When you sit in a chair or in bed, use pillows or a footstool to raise your leg to help reduce swelling. If your swelling does not go away in a few months, speak to your doctor.



# Promoting Foot Care and Footwear in the Community: A Case Study

**Janet L. Kuhnke**, RN BA BScN MSc NSWOC Dr Psych; **Sandi D. Maxwell**, BA Sociology (Hon); and **Audrey Walsh**, PhD

**Abstract:** The aim of this case study is to demonstrate the importance of an interdisciplinary and comprehensive approach in promoting appropriate foot care information and footwear for individuals living with diabetes mellitus in the community setting. The following case study details the journey of an adult who was diagnosed with Type 2 diabetes during the coronavirus pandemic. Patients living with diabetes face a high risk of developing foot complications, foot ulcers and amputation. This article presents a case study of a motivated client who engaged and who continued to be involved and advocate for her care needs.

**Key words:** *diabetes mellitus, education, prevention, foot care, footwear, self-management.*

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**D**iabetes mellitus (DM) is a major health-care concern and affects the more than 11.7 Canadians diagnosed with either pre-diabetes or diabetes<sup>1</sup>. Of concern are the risk of complications such as retinopathy, renal changes, cardiovascular disease, deformity, and lower extremity foot ulcers, amputations and early death<sup>1</sup>. Of the complications, this case study focuses on foot ulcers and amputation as feared by a person living with diabetes<sup>2</sup>. This case study is based on the recently released Wounds Canada (2022) *Foot Health Pathway for People Living with Diabetes: Integrating a Population Health Approach*<sup>3</sup>. This case is part of a larger ongoing community-based study exploring persons' experiences with foot care and footwear choices.

In this case study we discuss HH, an individual living in the community setting. We focus on her perception of risk and her preventative foot care and choice of footwear. We note deficiencies in the important information provided to HH that could help lower her risk of diabetes-related foot disease.

## Client/Patient Characteristics

HH is a 62-year-old female who has been living with diagnosed Type 2 diabetes for 15 months. She was employed for 40 years in the food service industry, primarily as a food server, walking (often in high heels) and standing for long periods of time. She has been retired for approximately 24 months. She has no children and lives alone. During the interview, HH was alert and engaged. Her health care has been consistent, and she has a family physician in the community where she resides. She relies on her pharmacist for medication information as needed and from the diabetes educator for nutrition and activity education. She states she uses the internet to search for health information and does not have any preferred websites.

## Data Collection

Data for this case study was collected with the permission of HH. She read and discussed an Informed Consent and a Letter of Information about the research study focused on foot care,

footwear and socks. Research ethics were approved by Cape Breton University, Nova Scotia, Canada.

### Examination/History

HH has a history of spinal changes with no surgical interventions. She is a long-time tobacco user. She has smoked 15-20 cigarettes a day for 40 years and is slowly reducing her cigarette use. She states she has no medical history except for a four-year history of feeling unwell (2018 to 2021). She states during this time she focused on weight loss and was successful in reducing her weight to her present 165 lbs, primarily through walking in the community. She states that during this time she experienced nausea, dizziness and sometimes fainted. Her grandfather, mother, brother and sister have been diagnosed with diabetes, and she stated she often wondered if she too had the condition. HH stated that in 2020 she began to experience heavy legs and had difficulty walking. With the support of her physician, she was assessed for lower leg venous disease. She had vascular testing – ankle brachial pressure index (ABI) and was diagnosed with varicose veins. She was tested but not diagnosed with diabetes at this time. She was measured for compression stockings and purchased two pairs at the community pharmacy. As well, she was professionally fitted for running shoes and inserts by a podiatrist. She wears her venous leg socks and professionally-fitted shoes daily and has

regular visits with the podiatrist (see figures 1, 2 and 3).

### Receiving a Diagnosis

In August 2021, HH continued to feel unwell and visited her physician. She stated:

“I thought I was dying of cancer, yet, you know, I also wondered if I had diabetes because of my long family history. You know my mother was admitted to the hospital with really high blood sugar, she had bad feet, toes, you know.” (HH, Nov. 2022)

HH was diagnosed with Type 2 diabetes and upon receiving her diagnosis, she was referred to and attended diabetes education sessions. She describes being taught about nutrition and the importance of walking to stay active. She was referred for a re-assessment of her prescribed footwear, which she attended, and continued to wear compression stockings. She went on to describe recent difficulty donning the compression stockings and, in turn, started to purchase and wear diabetic socks (over-the-counter). She does not recall having any education about proper foot care or nail care, other than being told to, “watch your feet” (HH, Nov. 2022). She stated: “I am not sure what they meant – watch my feet” (HH, Nov. 2022).

As part of the study, we discussed the current diabetes foot care recommendations for daily foot

Figures 1, 2 & 3: New footwear and compression socks



**Figures 4 & 5:** Foot care equipment in the home setting



checks<sup>4</sup>; the use of a mirror to aid in foot checks, not soaking her feet, using foot cream and wearing her recommended footwear. We asked HH about her current foot care routines. She shared the following with the researchers: “I have a history of having my nails trimmed and filed every eight weeks by a pedicurist as I can afford this care.” She then described in detail her foot care and foot soaking routine.

“I soak my feet in a foot bowl at home when I want. I soak my feet as this is how the pedicurist does my feet when I get my nails done. I use my heel file and put lotion on my feet and wear my socks and shoes. I am a great walker and walk daily throughout the village.” (see figures 4 and 5).

She further stated:

“Since I was diagnosed with diabetes, I called a foot care nurse to do my nail care, but I cannot afford that type of care – you know, the price was too high, and they were not in my community. So I go to the pedicurist, this is cheaper for me, under \$25.00. So, now that I know about not soaking my feet, why does the pedicurist still soak my feet when I go for my nail trimming? I told them I had been diagnosed with diabetes about a year ago.” (Field note, Nov. 2022).

We asked HH what she thought she would do with her new knowledge about not soaking her feet. She responded: “Well, I am going to tell them next time I go for nail care...they should not

be soaking my feet, I should not be soaking my feet either...” (HH, Nov. 2022).

HH also stated that she had recently learned from a friend with diabetes that she should, “... always wear shoes in the house, so now I wear these rubber shoes inside” (HH, Nov. 2022).

As part of the study, we shared the Diabetes Canada (2018) *Foot care: A step toward good health*<sup>5</sup> information and the Wounds Canada (2017) *Diabetes, Healthy Feet and Your Patients*<sup>6</sup> foot care client-centered health information. We read through the information with HH and discussed each point. HH wanted to know why no one gave her similar information about her diabetic foot care. She stated: “I think this is very different than my vein disease – why did a health-care person not give me diabetic foot information...I think I better give this to my pedicurist at the next visit?”.

HH readily reviewed the information aloud and talked about potential changes to her routine. She stated she, “could easily change and wash, and not soak her feet”. We asked her why she thought this change was possible. HH stated: “I do not want to have ulcers like my mother and family before me, everyone around me is losing their toes and legs – why? I do not want that to be me, I am young and have a lot of living yet to do.”

In relation to her blood glucose management, HH shared the following: “I keep track of my blood pressure and my blood sugar now, here let me show you my record keeping” (see figure 6). She stated she has shown her diary to the diabetic nurse educator who reviewed her progress

and encouraged her to continue. She stated: “I am really happy with my numbers since I take the diabetic medication. I know now why I felt unwell for so long”. HH was detailed in her efforts to keep daily track of her blood glucose and could describe the relationship to her activity and glucose levels. In closing, HH described her knowledge in relation to cigarette smoking and diabetes. HH described the following:

“Look, I know cigarettes are bad. I have smoked for so many years, I used to love weedless Wednesday to inspire me. I know if I have diabetes I should not smoke, lots of people have told me that. But look, everyone around me at work smoked, so I smoked. I am down to 10-12 cigarettes a day now. I know I must reduce my cigarettes, I am, well kind of, slowly. You know, it is hard work.” (HH and *Field note*, Nov. 2022)

In February (2023) we followed up with HH by phone. She related the following about caring for her feet: “You know, changing my habits is hard work. I find it harder than I thought it would be...you know, not soaking my feet.”

## Analysis

From our research visits, we learned that HH is a motivated person with strong family and peer support. She is comfortable asking questions of her health-care providers and utilizes her strengths and abilities to be responsible for her health care, including diabetes self-management.<sup>7</sup> She attends appointments with her family physician and knows her next appointment dates with the nurse at the diabetic clinic (nurses, registered dietitian). She is accurate in her calendar and health diary recording (figure 6) including a list of questions she wants to ask her family physician. HH readily sought funding for her compression socks and footwear when needed. Of note, is that HH did not seem to be aware of the role of diabetes socks versus compression socks.

HH was initially confident in her foot care routine. She stated: “I have good skin, soft, see no wounds...” (HH showed her feet to the researchers — see figures 7 and 8). She described in detail her routine to manage her foot care at home and was surprised that foot soaking was not recommended<sup>4</sup>. She wondered why foot care was not regularly discussed by her health-care providers, stating: “I am determined to keep going, I do not want to get sick like my Mom. My feet have always been a bother to me, so I soaked them, but why did no one tell me that this is not good?” (HH, Nov. 2022).

## Discussion

In this case study, the descriptions of lack of foot care education provided are also well-described in the literature. Matricciani and colleagues (2015) in an integrative review of nine studies stated that persons most often engage in self foot care practices only after a foot complication occurs.<sup>8</sup> This was similar for health-care practitioners responsible for foot care education (diabetes nurse educators, podiatrists and general practitioners) indicating that foot care education is often only reviewed after a foot care complication arises.<sup>8</sup> Similarly, Gallman et al. (2017) describe barriers to appropriate foot care to include: lack of education and skills for health-care professionals

**Figures 6:** Daily log

Date	Value 1	Value 2
1		
2		
3	24.1x	22.9
4	24.1x	17.0x
5	24.9x	25.9x
6	20.5x	16.3x
7	22.3x	20.2x
8	17.6x	16.5x
9	21.3x	22.5x
10	23.5x	23.1x
11	18.6x	19.9x
12	17.6x	12.1x
13	15.4x	17.9x
14	15.9x	19.1x
15	15.0x	4.3x
16	21.3x	15.6x
17	10.6x	13.0x
18	18.3x	10.3x
19	11.3x	8.6x
20	11.9x	6.5x
21	10.2x	4.4x
22	9.5x	6.0x
23	8.0x	7.2x
24	9.0x	7.5x
25	8.7x	7.5x
26	6.7x	6.4x
27	6.0x	5.7x
28	7.1x	3.8x
29	5.3x	6.6x
30	7.5x	5.7x
31		

Figures 7 & 8: HH's feet



and daily time constraints. As well, they note that if patients do not complain, a foot screen or examination may not take place, and some patients may refuse.<sup>9</sup> Kuhnke and colleagues<sup>10,11</sup>

in their pan-Canadian studies focused on barriers and solutions to implementation of best practice. They reported the need to support clinicians and to have the time to complete foot screening, and also emphasized the need for clinicians to develop the necessary attitude, knowledge, and skill to conduct foot screenings and risk stratification, and to have the time to practice foot screening. They also emphasize the need for funding for preventative nail care, foot care, and footwear supported by culturally relevant education for persons and their families.

From an organizational perspective, policy that supports prevention can be developed and led at the provincial level [in Canada]. For example, health leaders in Alberta<sup>12,13</sup> emphasized the need for organizational changes to be led through the implementation of a comprehensive foot care program.<sup>10,11</sup> In the province of Nova Scotia it was reported that, upon implementation of a diabetes-related foot pathway, screening increased significantly and follow up intervals improved.

Wounds Canada *Foot Health Pathway* has been released nationally.<sup>3</sup> Diabetes-related

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Reference: 1. West, D. (written communication-letter) December 2013

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foot complications, such as foot ulcers and amputations, are often leading causes of morbidity in patients with diabetes. This pathway focuses on prevention, as many of these diabetes-related complications are preventable and manageable through early identification of risk and intervention with an interdisciplinary team.<sup>1,2,4,7</sup> Many patients with diabetes lack the awareness and education to recognize the importance of daily foot care, what to look for and how to act when problems occur. Compounded with this challenge is the lack of timely, consistent and coordinated delivery of health services. Implementing the Wounds Canada *Foot Health Pathway* can assist clinicians, leaders, and policy makers to allocate resources that support a risk-based approach, including early risk assessment and plan-of-care, as well as re-screening, re-assessment and evaluation of the interventions typically involved in each aspect of care.<sup>3</sup>

## Summary

This case study is part of a larger study. This particular case highlights the story of a motivated client in the community. She has a family history of diabetes and amputation, and her narrative is rich and personal. She is motivated to do foot care according to the recommendations. She described the fear of amputation and wondered why health-care professionals did not review proper foot care, especially the recommendation against soaking her feet. This case study emphasizes the need for interdisciplinary health-care professionals to work collaboratively to ensure that current and comprehensive information is provided to

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individuals to support their self management of diabetes mellitus and reduce the risk of diabetic foot complications. ■

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# Clinician Perspectives on the New Offloading Announcement in British Columbia: An Interview with Dr. John Hwang



**Janet L. Kuhnke**, RN BA BScN MSc NSWOC Dr Psych; and **John Hwang**, MD FRCSC

**Abstract:** In this interview, Dr. John Hwang shares his vision for persons living with diabetes in the province of British Columbia and across Canada. Dr. Hwang is a general surgeon and physician lead at the Fraser Health Complex Wound Centre in British Columbia. He has specific interests in the optimal delivery of interprofessional wound care, as well as physician and wound care team engagement in quality improvement.

**Key words:** *diabetic foot ulcer, total contact casting, offloading.*

**How to cite:** Kuhnke JL, Hwang J. Clinical perspectives on the new offloading announcement in British Columbia: An Interview. *Limb Preservation Journal*. 2023;4(1): 51-52. DOI: <https://doi.org/10.56885/SDET7893>.

**O**n February 15, 2023 the province of British Columbia, Canada announced the availability of total contact cast (TCC) services for the treatment of diabetic foot ulcers (DFUs).

The announcement stated: “In addition, for clients with BC PharmaCare coverage, custom orthotics and adaptive shoes will be covered for those with diabetic foot ulcers recently healed with total contact casting.”<sup>1</sup>

Dr. John Hwang, a general surgeon and physician lead at the Fraser Health Complex Wound Centre in British Columbia, was posed the following questions on behalf of the *Limb Preservation Journal* by Janet L Kuhnke, RN BA BScN MSc NSWOC Dr Psych.

**Q: What is your vision for the future of diabetic foot care for the province of British Columbia (BC)?**

**Dr. John Hwang:** “As with many complex and chronic conditions, patients at risk for DFUs would benefit from a holistic, team-based, and multidisciplinary approach to their condition. Ideally, the foundation for this would be an

entire network around the patient of health-care providers and care partners emphasizing prevention and early detection, so that DFUs don’t occur in the first place.

If foot wounds in people living with diabetes are identified, it is important that the correct diagnosis is made, and that the patients then receive the right treatment, at the right time, delivered by the right care provider. It sounds simple...but it’s not.”

**Q: What implications do you foresee in the short and long-terms?**

**JH:** “In the short term, I don’t think it’s an exaggeration to say that this announcement will save both lives and limbs. We see a lot of patients who get recurrent DFUs because they’re unable to afford, or are otherwise unable to access, appropriate offloading footwear. In addition to being really deflating for patients, recurrent DFUs put patients at risk for serious complications like sepsis, amputations or even death. The 5-year mortality rate for DFUs is worse than many forms of heart disease and cancer. This is a big deal.

Hopefully, in the longer term, this is the first step of many towards building an entire health system geared towards ensuring that every patient with a DFU gets the same standard of care regardless of location, ethnicity, or socioeconomic status.”

**Q:** What existing partnerships can be drawn upon for this announcement to lead to measurable success?

**JH:** “Well, I suppose there are specific partners that are directly mentioned in this announcement: BC PharmaCare, wound care teams that provide total-contact cast treatment, orthotists that will build the offloading footwear, for example. But, again, the network that supports people living with diabetes with foot ulcers, or at risk for developing foot ulcers, goes far beyond just these few groups. Organizations like Diabetes Canada, Wounds Canada, and the Canadian Podiatric Medical Association are critical in advocating for, and then building, the networks that take patients through prevention and primary care of DFUs, right through to end-stage and palliative care. I’m probably beginning to sound like a broken record, but it really is about a health systems redesign to ensure that no one falls through the cracks. The provincial Ministry of Health and PharmaCare have taken a very important first step towards this.”

**Q:** Can you comment on this announcement in relation to the release of the Wounds Canada Foot Health Pathway?

**JH:** “The two are in lockstep and are supportive of one another. Again, it’s all part of collaboratively building a health system where DFU patients from British Columbia get the right treatment, at the right time, from the right person regardless of circumstances.” ■

**Janet L. Kuhnke**, RN BA BScN MSc NSWOC Dr Psychology is Associate Professor in the School of Nursing, Cape Breton University, Sydney, NS, Canada.

**John Hwang**, MD FRCSC is a general surgeon and physician lead at the Fraser Health Complex Wound Centre in British Columbia, Canada.

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## Outcomes of Hallux Amputation Versus Partial First Ray Resection in People with Non-Healing Diabetic Foot Ulcers: A Pragmatic Observational Cohort Study

Blanchette V, Houde L, Schmidt BM

**Abstract:** There are few data comparing outcomes after hallux amputation or partial first ray resection after diabetic foot ulcer (DFU). In a similar context, the choice to perform one of these two surgeries is attributable to clinician preference based on experience and characteristics of the patient and the DFU. Therefore, the purpose of this study was to determine the more definitive surgery between hallux amputation and partial first ray resection. We abstracted data from a cohort of 70 patients followed for a 1-year postoperative period to support clinical practice. We also attempted to identify patient characteristics leading to these outcomes. Our results suggested no statistical difference between the type of surgery and outcomes such as recurrence of DFU and amputation at 3, 6, and 12 months or death. However, there was a statistically significantly increased likelihood of re-ulceration for patients with CAD who underwent hallux amputation ( $p = 0.02$ ). There was also a significantly increased likelihood of re-ulceration for people with depression or a history when the partial ray resection was performed ( $p = 0.02$ ). Patients with prior amputation showed a higher probability of undergoing another re-amputation with partial ray resection ( $p = 0.01$ ). Although the trends that emerge from this project are limited to what is observed in this statistical context, where the number of patients included and the number of total observations per outcome were limited, it highlights interesting data for future research to inform clinical decisions to support best practices for the benefit of patients.

**Read at:** *The International Journal of Lower Extremity Wounds*. 2022; September 7; OnlineFirst. <https://doi.org/10.1177/15347346221122859>

## Knowledge and Practice of Diabetic Foot Care – A Scoping Review

Manickum P, Mashamba-Thompson T, Naidoo R, Ramklass S, Madiba T

**Background and aims:** This review aims to systematically map global evidence on foot care knowledge and practices in relation to diabetes mellitus (DM) and identify areas that need further research.

**Methods:** Database searches were undertaken using Google Scholar, Medline (PubMed), Academic Search Complete (EBSCOhost), and Medline (EBSCOhost). Studies were initially sought by title and focused on knowledge of diabetic foot ulcer burden. The framework by Arksey and O'Malley and the PRISMA-SCR guidelines were used to guide the methodology. The themes explored were principles of foot care knowledge and practice and these were reported using content analysis. The mixed-methods appraisal tool (MMAT) was employed to appraise the quality of the primary studies.

**Results:** Fifty-eight studies published between 2008 and 2018 met the inclusion criteria. Participants in various studies had varying degrees of foot care knowledge and practice, including foot inspection, foot hygiene, glycaemic control, and foot protection. Many people had knowledge of the various aspects of foot care but fewer practiced proper foot care. The MMAT showed the majority of the articles to be of high quality.

**Conclusions:** Levels of foot care knowledge and practice varied in the studies. A need for intervention on foot care was highlighted.

**Read at:** *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*. 2021;15(3): 783-793.  
<https://doi.org/10.1016/j.dsx.2021.03.030>

## Tackling Diabetic Foot: Limb Salvage During the COVID-19 Pandemic

Schmidt BM, Shin L

**Purpose:** Lower extremity amputation resulting

from diabetic foot ulcer, with neuropathic and/or ischemic etiologies, remains a devastating and costly complication of diabetes mellitus. This study evaluated changes in care delivery of diabetic foot ulcer patients during the COVID-19 pandemic. A longitudinal assessment evaluating the ratio of major lower extremity amputation to minor lower extremity amputations after implementation of novel strategies to combat access restrictions was compared to the pre-COVID-19 era.

**Methods:** The ratio of major to minor lower extremity amputation (i.e. the high-to-low ratio) was assessed at two academic institutions, the University of Michigan, and University of Southern California, in a population of patients with diabetes who had direct access to multidisciplinary foot care clinics in the 2 years prior to the pandemic and the first 2 years of the COVID-19 pandemic.

**Results:** Patient characteristics and volumes including patients with diabetes and those with a diabetic foot ulcer were similar between eras. In addition, inpatient diabetic foot-related admissions were similar, but were suppressed by government shelter in placed mandates and subsequent COVID-19 variants surges (e.g. delta, omicron). In the control group, the Hi-Lo ratio increased every 6 months by an average of 11.8%. Meanwhile, following STRIDE implementation during the pandemic, the Hi-Lo ratio reduced by (-)11% ( $p < 0.001$ ) and doubled limb salvage efforts as compared to the baseline era. The reduction of the Hi-Lo ratio was not influenced significant by patient volumes or inpatient admissions for foot infections.

**Conclusion:** These findings signify the importance of podiatric care in the at-risk diabetic foot population. Through strategic planning and rapid implementation of at-risk diabetic foot ulcer triage, multidisciplinary teams were able to maintain accessible care during the pandemic which resulted in a reduction of amputations. Furthermore, this manuscript highlights the value of the Hi-Lo ratio as an indicator of institutional limb salvage efforts.

**Read at:** *Ther Adv Endocrinol Metab*. 2023;14:1-7.  
<https://doi.org/10.1177/20420188231157203>

## Frailty in People with Chronic Limb Threatening Ischemia and Diabetes-Related Foot Ulcers: A Systematic Review

Fernando ME, Blanchette V, Mishra R, Zulbaran-Rojas A, Rowe V, Mills JL, et al

**Background:** Frailty represents a state of multi-system impairment that may adversely impact people presenting with chronic limb-threatening ischemia (CLTI) and diabetes-related foot ulcers (DFUs). The aim of this systematic review was to explore the association between frailty and outcomes from CLTI and DFUs.

**Methods:** We performed a systematic literature search of electronic databases to find studies using a validated measure of frailty in individuals with CLTI and/or DFUs. The primary outcomes were the impact of frailty on the severity of initial clinical presentation and unfavourable follow-up outcomes including readmissions, major limb amputation, cardiovascular events, revascularization and wound healing.

**Results:** Ten cohort studies were included. Two studies had a low risk of bias, 1 was unable to be assessed, 5 had moderate risk of bias, and 2 high risk of bias. The prevalence of frailty in people presenting with CLTI ranged from 27% to 88% and was 71% in people with DFUs. The presence of frailty in both people with CLTI and DFUs was associated with substantially increased severity at presentation (severity of ischemia and tissue loss) and poorer outcomes at follow-up (risk of readmission, limb amputation, and all-cause mortality).

**Conclusions:** The presence of frailty in both people with CLTI and DFUs is likely associated with substantially higher complexity at presentation followed by a greater risk for readmission, amputation, and death during follow-up. Heterogeneity in the tools used to screen for frailty, poor definition of frailty, and unclear evaluation of exposure and outcomes limit further interpretation of findings.

**Read at:** *Annals of Vascular Surgery*. 2023;89: 322-337.

<https://doi.org/10.1016/j.avsg.2022.09.057>

## An Unusual Case of May-Thurner Syndrome in a Middle-Aged IV Drug Abuser

Danish A, Mohammed A S, Kanagala S, et al

**Abstract:** May-Thurner syndrome (MTS) is an extrinsic venous compression of the ilio caval venous territory by the arterial system. MTS is common in middle-aged women. Despite its importance, it is uncommonly considered in the differential diagnosis of deep vein thrombosis (DVT), especially in males with other risk factors. Due to the perianal abscess, a 35-year-old male health-care worker was abusing IV opioids through his left leg veins. His symptoms included signs and symptoms of cellulitis around the catheter site, followed by recurrent DVTs due to poor response to anticoagulation therapy alone. A comprehensive workup revealed the diagnosis of MTS. The patient eventually required endovenous treatment with stent placement, after which his condition improved dramatically.

**Read at:** *Cureus*. 2022;14(9): e29360.

<https://doi.org/10.7759/cureus.29360>

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