

Photo: Swift Medical Inc.

The Use Of AI Informed Technology For Wound Care Progress Tracking And Data Analysis: Rural And Northern Perspectives

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Wound care presents considerable burdens to staff time and financial resources in Canada. Accordingly, challenges facing equitable, sustainable, and cost-effective wound care in Canada remain. Wound care expenditures account for around \$12 billion CAD annually in Canada, comprising 3.1% of total health-care expenditures in 2024.^{1,2} Approximately 50% of community-delivered nursing visits involve wound care.³ Most wound management costs directly relate to chronic wounds, which are commonly associated with aging and prominently affect individuals residing in long-term care settings.⁴

There is a growing need for comprehensive, specialized wound care education for all frontline nurses and care aides, but there is lack of resources available to develop and implement this training. There is a need for standardized infrastructure and protocols to support the increase in caseloads of frontline workers and health-care providers treating wounds. Addressing issues for timely and high-quality wound management could significantly decrease associated costs and improve the quality of life for Canadians.

In response, many researchers, health system leaders and wound care organizations are constantly creating and sharing literature, recommendations and manuals that ultimately aim to create an equitable, efficient and cost-effective wound care system in Canada. Often, recommendations propose prioritizing wound care to reduce hospitalizations and health-care costs.^{3,5}

In 2020, Wounds Canada released a 2021 Pre-Budget Consultation Submission to the Standing Committee on Finance of the Government of Canada.⁵ In this document, a series of recommendations to implement for

wound care across Canada was shared. These recommendations were:⁵

1. Wounds Canada urges the Government of Canada to work with the provinces and territories to develop national wound care standards.
2. Wounds Canada urges provincial and territorial leaders to prioritize wound prevention and care, ensuring that patient care is equitable, timely, non-fragmented, and accessible across jurisdictions.
3. Providing access to wound care products and technology that are evidence-based and improve patient outcomes.

Technologies to support wound care have the potential to streamline workflow for clinicians, guide clinical best practices and, ultimately, improve care and cost outcomes.³ The benefits of technology-informed wound care management include improved evidence-based care and enhanced data collection, measurement and analytic approaches. Such features support education in wound management and prevention, which has the potential to promote interdisciplinary collaboration and foster relationships between organizations involved in wound care management. Promoting the adoption of technologies for wound care management may be an effective solution for supporting the recommendations made by Wounds Canada and could ultimately improve equitable access to wound care management in Canada.

The Centre for Technology Adoption for Aging in the North (CTAAN) is a National Innovation Hub that supports aging in northern British Columbia (BC) by improving the availability of technologies to support older adults and their members of their circles of care. (For more information on CTAAN visit www.ctaan.ca). In the spring of

2024, CTAAN facilitated a series of workshops featuring Swift Skin and Wound™, a wound care assessment software created by Swift Medical (Chicago, Toronto).

Swift Skin and Wound uses AI technology to provide specialized wound care management. Using images of a patient's wound, the software can measure length, width, depth and surface area of a wound. Further, the platform tracks the progress of a wound by employing automatically calculated progression metrics, which can be used by clinicians to tailor care plans according to the progression of a wound. For more information on this technology visit <https://swiftmedical.com/solution/>.

Background

Wounds are often thought of as minor cuts or scrapes, but chronic and complex wounds, such as diabetic ulcers, pressure injuries or post-surgical wounds, pose serious health risks if they fail to heal properly.⁶ These wounds can be life-threatening, costly, and place a significant burden on the health-care system. In 2003, research was conducted in a variety of settings across Canada that found the point prevalence of pressure ulcers to be 29.9% in long-term care.⁷ This study also found that in BC, 24.1% of the community care population had pressure ulcers.⁷ More recently, a study from 2024 reported the prevalence of pressure ulcers as 18.9% across long-term care homes in Ontario during a one-year research period, beginning in January 2019.⁸ The Canadian Institute for Health Information (CIHI) reported chronic wounds were found in 9.6% of the Canadian long-term care population in 2011-2012.⁹ Despite the high prevalence of wounds and the availability of appropriate treatments, systemic issues prevent the consistent implementation of evidence-based treatments

that could improve wound healing.

Key challenges in wound care include a lack of standardized treatment protocols across health-care settings and gaps in data collection, making it difficult to track and measure patient outcomes effectively.⁶ The absence of accurate prevalence and incidence data limits the ability to justify funding and develop programs for better wound care. Additionally, many health-care facilities across Canada rely on out-of-date, analogue methods, such as paper forms or manually uploading wound images, which create inefficient charting protocols and fragmented information for health-care providers. Addressing these inconsistencies is essential for improving patient care and optimizing health-care resources.

In 2012, The Canadian Home Care Association (CHCA) provided recommendations on best practices for wound care,³ which addressed the benefits of leveraging technology-informed wound care management. There are many similarities between CHCA's recommendations, and the in-depth recommendations provided more recently by Wounds Canada in 2020.^{3,5} This informs us of how much work remains for implementing effective wound care across health-care facilities in Canada (See Table 1).

Where technology is been adopted by wound care professionals in Canada, it is often used for integrating wound management software into the Electronic Medical Records (EMR) used by the health authorities. These software deliver automatized remote monitoring protocols that enhance data access for experts, increase electronic exchange of clinical information, and provide computerized tracking systems.

Technologies being considered for use by wound care professionals must adhere to policies implemented by regional health care governing bodies. In BC, in partnership with wound

Table 1: Recommendations For Wound Care Management Provided (CHCA and Wounds Canada)^{3,5}

| CHCA (2012) | Wounds Canada (2020) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Accelerate the adoption of technology to improve access to best practice guidelines, to support point of care access to expertise (e.g. through remote monitoring or digital imaging) and to support data collection. | Provide access to wound care products and technology that are evidence-based and improve patient outcomes. |
| Improve access to products, devices and adjunctive therapies across health-care sectors and client geographies, such that issues related to setting of care (e.g. cost, provider knowledge, geographical constraints) are not barriers to recommended treatment. | Develop policies that prevent wounds such as pressure injuries and infected wounds from developing in acute and home care settings. |
| Mandate continuing education in wound management and prevention for all clinicians involved in caring for patients living in the community with wounds and improve the resources available to the public on effective management and prevention of wounds. | Increase wound-related education and information for health-care providers, patients, and families. |
| Support interprofessional collaboration to optimize professional capacity and ensure that the right care is delivered at the right time by the right provider. | Ensure that interprofessional teams include wound experts. |
| Provide measurement and analytic support to care teams so performance outcomes can be readily available and can be used to continuously improve practice by building upon lessons learned. | Implement wound prevention and management pathways in all settings, from hospitals to home and community care, with set measurables, monitoring, and evaluation. |

clinicians from First Nations Health Authority, Fraser Health Authority, Interior Health Authority, Island Health Authority, Northern Health Authority, Provincial Health Services Authority, Vancouver Coastal Health Authority and Providence Health Care, the BC Provincial Nursing Skin and Wound Committee created a series of guidelines for the assessment, prevention, and treatment of different types of wounds for different types of patients.¹⁰ These guidelines were developed in accordance with the policies from each of the health authorities (HAs) involved and are available for public online access through the Connecting Learners With Knowledge (CLWK) webpage (clwk.ca).

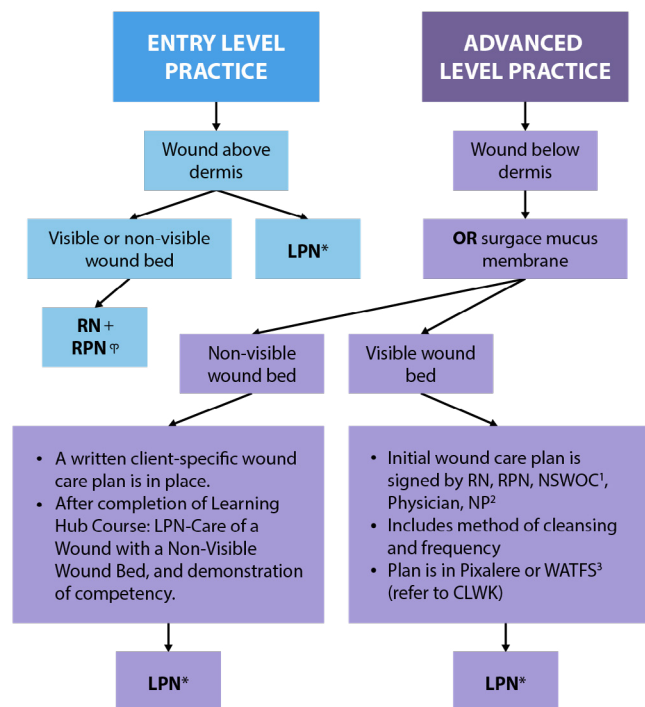
The CLWK website, created in 2022, is associated with the British Columbia Professional Practice Stream of Wound Ostomy and Continence.

The CLWK guides include Treatment of Moisture Associated Skin Damage (MASD) in Adults and Children,¹¹ Wound Management Guideline Summary Flowsheet,¹² and Procedure: Wound Packing¹³ among many others.

Aside from the provincial protocols established by the BC Provincial Nursing Skin and Wound Committee and available through CLWK (clwk.ca), each health authority has its own policies and clinical practice standards. In the case of Northern Health Authority, Nurses Specialized in Wounds, Ostomy and Continence (NSWOCs) and physicians assess severe wounds or authorize care plans for Registered Nurses (RNs) and Registered Psychiatric Nurses (RPNs) to execute, in cases of non-severe wounds. Licensed Practical

Nurses (LPNs) assess, clean, and dress wounds. Wound care plans in Northern Health Authority will be found in the digital documentation tool (Pixalere™) or on the Wound Assessment and Treatment Flowsheet (WATFS), found on the CLWK website.¹⁴ Other health authorities in BC report similar protocols and best practice recommendations based on similar information systems and adherence to the publicly available CLWK guidelines.¹⁰

Pixalere™ is a wound management software solution for the aged, community and disability care sector, which features intelligent algorithms that determine best practice management and treatment plans at the bedside.



* Licensed Hurse Practitioner 1 Nurse Specialized in Wound Ostomy and Continence
 † Registered Nurse 2 Nurse Practitioner
 ‡ Registered Psychiatric 3 Wound Assessment and Treatment Flowsheet

Figure 1: Wound Assessment Protocol Across BC Health Authorities: An Adaptation From Northern Health’s Wound Care Assessment Protocols.¹⁴

Despite the availability of advanced wound care technologies and standardized guidelines, significant barriers remain in ensuring equitable and effective treatment across health-care settings. Addressing inconsistencies in data collection, improving access to evidence-based interventions and integrating digital tools into clinical practice is crucial for optimizing patient outcomes across the Canadian health-care system.

CTAAN's Approach to End User Consultations

Built on a partnership between the University of Northern British Columbia, Northern Health Authority and AGE-WELL, CTAAN's programs focus on testing, piloting, implementing and promoting new and existing technology solutions tailored to support older adults and their caregivers (known as *AgeTech* technologies) in northern and rural communities. CTAAN's AgeTech Discussions: Exploring Perspectives on Technology (ADEPT) workshops, which focus on creating spaces for discussing the possible implementation of AgeTech in settings in northern and rural BC, are important first steps for AgeTech implementation. These workshops gather feedback from end users' perspectives on the applicability and feasibility of various featured AgeTech solutions.

AgeTech is a term for the type of technology that helps older adults and their caregivers. It can also refer to services and practices that improve the lives of older adults. AgeTech technologies can involve everything from housing and health care to autonomy, mobility, mental health, well-being, financial health, communication, and maintaining social connection.¹⁵

CTAAN conducted workshops featuring Swift Skin and Wound in spring-summer 2024, which included participants with experience in long-term, community, and hospice care settings, as well as digital health settings. Workshops were digitally recorded, and audio was transcribed verbatim and checked for accuracy, followed by being analyzed to devise themes in the data, informed by Braun and Clarke's¹⁶ guide to thematic analysis. A report that shared the results and recommendations of participants in the workshop is available on the CTAAN website (www.ctaan.ca). Ethical approval for the ADEPT workshops was provided by the University of Northern British Columbia's Research Ethics Board (H22-00499), the Northern Health Operations Board (RRC-2022-004) and the National Research Council (2022-56).

Beneficial Features To Be Integrated Into Wound Technologies

While most participants did not have any direct experience with advanced AI informed wound care technologies like Swift Skin and Wound, there was clear consensus that the features that should be prioritized within a wound care management system: wound identification, tracking, care planning, and treatment recommendations. Overall, the participants indicated that the technology should be easy to use and smoothly integrate with other existing systems, while also maintaining compliance with privacy regulations. The findings are presented in a thematic narrative format identifying salient quotes from participants (See Table 2). Four key themes were developed through the analysis:

Theme 1: Confidence and Hope for Improved Wound Care and Management

Swift Skin and Wound (referred to as wound care, or WC, assessment technology) was identified as a promising tool, highlighting its advanced AI capabilities for wound measurement, tracking, and analysis. Participants shared experiences of frustration with chronic wound care but anticipated improved outcomes using this technology. The participants also saw potential for expanding the roles of health-care aides and personal support workers in wound management, fostering collaboration, and enhancing their professional engagement. Additionally, the tool was recognized as valuable for educating care providers with limited wound care knowledge and empowering patients in northern and rural communities. Overall, participants expected the WC assessment technology to boost confidence, communication, and teamwork in wound care.

Theme 2: A Superior Tool to Enhance Treatment and Care Compared to Current Practices.

Pixalere is a commonly used wound management software. Participants shared that the first generation of Pixalere is available in health-care facilities. When comparing both technologies, participants noted that the WC assessment technology was more dynamic and supports more upstream solutions. As the WC assessment technology is AI-powered, its measuring and prediction capabilities have the potential to ameliorate current inconsistencies in data entry. It was also noted that the WC assessment technology supports more in-depth understanding of specific wound progression or regression, by collecting and analyzing real-time data. Thus, participants anticipated more timely treatment decisions.

Theme 3: Adaptive Change Processes for Successful Adoption

The implementation of new technologies can be difficult as it requires time and effort for users to develop familiarity, trust, and confidence. The WC assessment technology could potentially face resistance, especially from frontline workers and management staff, due to the widespread use of existing software, as well as concerns about inconsistencies in charting methods. While some participants saw potential for adoption, especially in smaller communities where analogue and virtual systems are in use, others viewed these inconsistencies as a barrier for implementation. Despite possible apprehension from facility managers, implementing education on the tool's advanced functionality and usability could improve acceptance. To facilitate adoption, participants recommended a gradual transition process.

Table 2: Key Themes, Supported By Quotes From ADEPT Workshops Featuring Swift Skin and Wound™.

| Theme # | Gender | Age | Role | Quotes and Testimonies |
|------------------------------------------------------------------------------------------|--------|-----|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Theme 1: Confidence and Hope for improved Wound Care and Management | Female | 51 | Community Services Manager | "[It] is a game changer on the quality front, for patients and for preventing [hospital/emergency room] admissions." |
| | Female | 52 | LTC Operations Executive | "Realistically, [HCAs] are the ones that are going to catch something before it becomes ... So, I think for like that would be amazing if somehow their scope of practice could be integrated in this - that would be huge." |
| Theme 2: A Superior Tool to Enhance Treatment and Care Compared to Current Practices. | Female | 51 | Community Services Manager | "The standardization component as, with the AI technology, taking out the inconsistencies that you have from one practitioner to another is really helpful and useful in terms of monitoring and assessing whether a wound is getting better or not." |
| | Male | 46 | LTC Manager | "Where you can look at what's happening across multiple sites. To see what is working for us at site X versus site Y." |
| Theme 3: Adaptive Change Processes for a Successful Adoption | Male | 48 | Digital Health Manager | "We're at a low in EMR adoption level and so trying to put a powerful tool like on top of that state can be problematic." |
| | Female | 40 | Care aide | "I think it would be hard to start, but once everybody tries and sees what it can do, I think people would really like it, especially because we do have the, not everywhere,[we could see the changes." |
| Theme 4: Practical Implementation Logistics and System Compatibility | Female | 52 | LTC Operations Executive | "It would be usability, in terms of trying to avoid as much as possible the nurses hav[ing] to double chart. I don't want them to have to chart everything here, but then they still have to go into progress notes and chart stuff there." |
| | Male | 46 | LTC Manager | "I really like that [it works on most tech] because we're running with some older technology from time to time, particularly around some of the nurses, like they just have older phones." |

Theme 4: Practical Implementation Logistics and System Compatibility

Participants reflected on the low Electronic Medical Records (EMR) implementation rates as a challenge to implementing new clinical systems. Full integration of the WC assessment technology with existing EMRs will be essential to the usability and sustainability of this software. As EMRs vary widely across and even across health jurisdictions, inconsistency in interoperability with existing systems can be challenging. Some facilities, particularly long term care facilities (LTCFs), still rely on paper-based tracking, necessitating a slower transition to new technology.

Despite these challenges, participants found the WC assessment technology, compatible with major operating systems, older devices, and offline functionality, making it suitable for northern and rural communities with limited connectivity. The adoption of the WC assessment technology depends on the 'enthusiasm' of care providers to implement the technology as well as on executive and managerial commitment to secure funding for implementation.

Participants viewed the WC assessment technology as an exciting opportunity to implement an interdisciplinary tool that would be easy to use and had great potential to optimize productivity and reduce workload for at-capacity frontline staff. Additionally, participants mentioned the benefits of implementing this technology to support chronic wound patients living in the community as well as at LTCFs, especially in areas that lack human and health-care resources. They also discussed the potential benefits of the technology to wound specialists, such as NSWOCs. Altogether, three notable features that should be prioritized before implementing WC assessment

technology-informed health-care systems include:

1. Data tracking and management
2. Ease of use/ease of data interpretation
3. Ease of upload for photos or additional documents.

The participants also highlighted that the main barriers for implementing the technology are cost and the potential incompatibility between the WC assessment technology and existing clinical systems.

Discussion

While specialized technological tools for wound care are in a constant process of adoption across BC, there is a recognized need in both the home and community care, as well as the long-term care sectors, to implement technology-based and evidence-based practice to ensure high quality cost-effective wound care management.

Findings highlight both the enthusiasm and challenges surrounding the implementation of AI-powered wound care technology at the health-care systems level. While there is a clear recognition of the need for advanced wound care solutions, the successful adoption of such technology requires addressing infrastructure, training, and system integration barriers. One significant advantage, as highlighted by participants, is its potential to standardize wound assessment through AI-driven measurements and predictive capabilities. This standardization could reduce inconsistencies in documentation and decision-making, which are common issues with existing wound care practices.

However, implementing new technologies into the health-care system presents notable challenges, including concerns about compatibility with existing EMR systems, particularly in facilities where digital adoption is low.

Table 3: Challenges And Opportunities Of Integrating Technology Into Wound Care

| Challenge | Opportunity/Recommendation |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| At-capacity health-care professionals and excessive workload for frontline workers. | Wound care management technologies, like Swift Skin and Wound, foster collaboration and enhance staff efficiency by streamlining record keeping processes. |
| Minimum capacity to attend and conduct educational modules on wound care. | Within the platform, trained staff can use patient processes as case studies and upskill other care providers in wound management. |
| Lack of literacy on data needs in care facilities. | Work with specific facilities to understand data needs and develop seamless data pathways for staff to use. |
| Inconsistencies in EMR adoption and data processes across facilities. | Work with facilities to understand barriers to EMR adoption and address the inconsistencies in data records through streamlined, digitized record keeping processes. |
| Budget and capital demands for implementing costly technologies. | Technology developers should consider free trial periods for facilities to raise awareness of the benefits of technology implementation. Facilities should apply for grants to subsidize the implementation of innovative technologies. |
| Suboptimal record keeping practices. | Collaborate with facilities to understand data needs and promote technologies which streamline recording keeping processes. |
| Insufficient adoption of technology. | Customize/personalize technology packages according to each facility's needs while following appropriate facility, regional, and provincial policy. |

The lack of uniformity in EMR systems across health authorities creates an additional obstacle, as not all facilities have the necessary infrastructure to seamlessly integrate new digital tools. Additionally, the financial implications of adopting new technologies, including costs associated with subscriptions, maintenance, and staff training, can be seen as significant barriers. Features such as offline functionality, compatibility with older devices, and intuitive interfaces were identified as crucial factors that would facilitate adoption and usability especially in rural and northern communities.

Wound care assessment technology was widely regarded as an innovative tool with the potential to enhance wound care management. By adopting a wound care management software, challenges have the potential to become opportunities, which are highlighted in the study as recommendations for the effective implementation of the technology in the region (See Table 3).

Moving Forward

A concerted effort is needed to bridge gaps in wound care technology adoption by enhancing interprofessional collaboration, investing in innovative technologies, and ensuring that standardized protocols are consistently implemented across all health authorities. By doing so, health-care leaders can strengthen the wound care management system thereby improving patient care and reducing the burden on health-care resources. The workshops revealed both the enthusiasm for innovative wound care technologies and the challenges that must be addressed for their successful implementation.

A multifaceted approach is necessary to facilitate the adoption of wound care assessment technology, such as Swift Skin and Wound, and

similar technologies. This includes securing funding to support implementation, providing comprehensive training to health-care professionals and ensuring seamless integration with existing clinical systems.

By investing in innovative digital solutions and prioritizing equitable access to wound care technology, BC can enhance its capacity to manage chronic wounds more effectively, ultimately improving patient outcomes and reducing the burden on health-care resources.

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