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CADTH Horizon Scan

Electrospun Healing Fibres for the Management of Burns and Wounds

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Key Messages

- Horizon Scan reports provide brief summaries of information regarding new and emerging health technologies; Heath Technology Update articles typically focus on a single device or intervention.
- These technologies are identified through the CADTH Horizon Scanning Service as topics of potential interest to health care decision-makers in Canada.
- This Horizon Scan summarizes the available information regarding an emerging technology, Spincare Wound Healing System, for the management of burns.

Spin Webs of Nanofibres with the Spincare Wound Care System

The Spincare Wound Care System allows health care providers to spray a web of protective nanofibres onto wounds creating a protective barrier during healing.

How It Works

The Spincare Wound Care System is a hand-held portable device that is used to spray wounds with a biocompatible and biodegradable electrospun healing matrix.[1] The device uses pre-filled, single-use ampules containing the matrix compound which is then sprayed onto the wound.[1] A laser guidance system indicates to the user when they are the appropriate distance from the wound. The company is developing a variety of compounds that will eventually be used to manage a wide range of different wound types.[1] The nanofibre matrix, made up of a web of fibres that are nanometers in diameter, creates a temporary skin-like layer to protect the wound from micro-organisms while allowing it to breathe and drain any exudate. When the matrix comes into contact with the moisture of the wound it becomes transparent so clinicians can easily make a visual assessment of the wound without having to remove a dressing.[1] The matrix moves like skin and provides the patient with range of motion and the ability to shower after application without concern.[1] When the skin underneath has healed, the nanofibre matrix peels off on its own. With the Spincare system, there is no need to change any bandages during the healing period which can help to reduce pain for the patient and save time on dressing changes.[1]

Who Might Benefit?

In Canada, 1 report estimates 45,000 people experience a burn each year.[2] The rate of emergency room visits and hospitalizations in Canada due to burns has lessened over time, but burns continue to be a concern for the health care system.[3] The majority of burns are caused by scalds, followed by contact with hot objects.[3] The Spincare system is currently meant for the treatment of superficial wounds or partial thickness burns.[1]

Availability in Canada

The Spincare Wound Care System is not currently available for use or purchase in Canada. The manufacturer's website indicates that an FDA submission is pending and the Spincare Wound Care System is not currently available for use in the US.[1] The Spincare Wound Care System is Conformité Européenne (CE) marked and is currently available for clinical use in 15 countries in Europe and Asia.[4]

What Does It Cost?

No Canadian cost information was available. No other cost information was identified. The manufacturer's website suggests that the Spincare system is a cost-effective solution as compared to advanced wound care bandages, but no specifics related to that comparison were provided.[1]

In 2018, the total cost (including deaths, hospitalization, emergency department visits, and disability) of fire or burn related injuries in Canada exceeded $299 million.[5] Costs associated with burn care include dressing changes and wound inspection. Patients and informal caregivers often have to travel to accommodate care.[3]

The manufacturer states that use of the Spincare device requires no specific training and can be used by any health care professional in any health care setting, thereby increasing access to this type of care and reducing the costs associated with care that may require a specialist to provide it.[1]

Current Practice

The 2018 Canadian Association of Wound Care (Wounds Canada) best practice recommendations for the prevention and management of wounds[3] recommend the use of an evidence-informed plan for managing wounds based on the patient needs, type of wound, and the environment. For burns, clinicians should consider wound cleansing and debridement, moisture control, and bacteria management.[3] Acute burns should be cleansed using sterile solutions where possible.[3]

The authors of the guideline[3] referred to a European guideline[6] when presenting the following characteristics of a good burn injury dressing:

- Promotes autolytic debridement of non-viable tissue
- Protects against infection and environmental contamination and/or trauma
- Maintains a moist wound environment while containing or wicking away excess moisture
- Reduces evaporative losses
- Is non-adherent to protect delicate skin
- Contours easily and conforms to the wound bed
- Aids with splinting or immobilization

- Is aesthetically pleasing
- Is easy to apply and remove
- Is painless on application, with wear, and on removal
- Is cost-effective (including the cost of the product, frequency of dressing change and the cost of health care professionals' time) (p.53 to p.54).[3]

The types of dressings typically used for burn injuries include: acrylic dressings, calcium alginates, film or membranes, foams, gelling fibres, hydrocolloids, hydrogels, non-adherent contact layers, and pain-controlling dressings.[3] For major burns, xenografts, allografts, autografts, or skin substitutes are commonly used to aid in wound coverage and reconstruction.[3]

What Is the Evidence?

A single-centre prospective observational trial was conducted by Schulz and colleagues in Germany where investigators treated 10 adults with clean superficial to partial thickness wounds, including burn wounds and skin donor sites, using a nanofibrous dressing applied using the Spincare Wound Care System.[7] After the nanofibrous dressing was applied, the wounds were covered with a thin silicone layer and dry gauze and removed after 2 days. After the silicone and gauze were removed, patients were able to shower normally. As wound healing progressed, the nanofibre dressing peeled off on its own.[7] The participating medical staff found the Spincare device easy to learn. No adverse events, infection, or safety issues were observed. The application of the nanofibrous dressing using the Spincare system did not cause additional pain for the patients. Healing time for the treated wounds ranged from 9 to 30 days.[8] The investigators reported very good aesthetic outcomes for all wounds after 12 months of healing.[7] The investigators cited the ability to easily customize the size of the nanofibrous dressing to match the size of the wound as 1 of its benefits. Additionally, the lack of requirement for any additional dressings allows patients to maximize the range of motion of the affected area, which enhances the use of extremities for physiotherapy and everyday activities.[7]

A prospective, open-label multicenter randomized controlled trial of healing at the donor site on the thigh after the split-thickness skin graft excision comparing the use of a nanofibrous polymer-based matrix applied with the Spincare system with standard care wound dressings.[9] The primary outcomes evaluated was wound healing using the Draize score, which measures the level of irritation at the site of the wound and time to complete re-epithelialization.[9] Secondary outcomes included ease of use of the Spincare device by the physician, application time, post-operative pain scores, infection, device-related adverse events, itching, and scarring. The dermal irritation scores were significantly lower in the Spincare group on day 1 but were similar between groups in the days following.[9] Average time to re-epithelialization, adverse events, pain, infection, itching and scarring were all similar between the 2 treatment groups. The investigators described similar quality of life improvements as Schulz and colleagues.[9]

Safety

No safety issues or adverse events were reported in the identified clinical studies[7,9] or highlighted by the manufacturer.

Issues to Consider

Managing burns can be time consuming and painful. A system like Spincare that allows patients to shower almost immediately after application and not have to return for, or endure, frequent dressing changes could make a big difference to quality of life. Additionally, this type of wound management could result in a reduction in the amount of time required away from a patient's work and personal life needed to attend and travel to appointments. The elimination of the need to change the wound dressing could also put less strain on family or caregivers who help with wound care at home.

Related Developments

Other nanofibre delivery systems have been developed but the systems had previously been large and difficult to use. According to the manufacturer, the Spincare system is the only electrospinning devices that is handheld, battery operated, and portable.[1] The manufacturer has stated their intention to create a variety of ampules that would allow for appropriate care for more complex wounds. Additional materials may include collagen, antibacterial compounds, or human cells.[1] The system may eventually include drug delivery, extended release of materials onto the wound surface, or may be used in cosmetic or medical aesthetics clinics.[1]

Looking Ahead

The Spincare Wound Care System is currently being used at a major trauma hospital in Israel to manage burn wounds,[10] and is being used in an investigational capacity throughout Europe and Asia. The company's US presence is being established. While it is unclear when this specific technology may be available in Canada, it could have the potential to change the way burn wounds are managed, provided the ongoing investigational work in Israel, Europe, and Asia continues to demonstrate the device's potential positive clinical impact. The device's ease of use and portability could allow for more patients to have their wounds treated and managed closer to home without the need to visit regional centres for more advanced care.

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