

# Update on Wound Bed Preparation:

**A review of the principles of treating the root cause of wounds, pain and wound healing, and local wound care**

**PRESENTERS:**

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**A**ttendees at this session were introduced to the following concepts of wound bed preparation:

- treating the cause and addressing patient-centred concerns, including pain;
- understanding healable, non-healable and maintenance wounds in the context of wound bed preparation;
- optimization of local wound care (i.e. debridement, infection–inflammation and moisture balance); and
- understanding superficial critical colonization and deep infection.

**Treat the cause**

Dr. Sibbald began by showing the wound bed preparation paradigm in patients with chronic wounds (Figure 1). With respect to treating the cause, the following recommendation apply: determine the blood supply available to promote healing; identify and treat the cause (if possible) to determine healability; and review the cofactors and comorbidities to create an individualized plan of care. Table 1 outlines

TABLE 1

**Treatments for the causes of various wounds**

Wound type	Treatment of the cause
Venous ulcer	Bandages for healing. Stockings for maintenance.
Pressure ulcer	Relieve, reduce and redistribute pressure. Promote activity and decrease immobility. Manage incontinence and moisture. Reduce shear and friction. Enhance and optimize nutrition.
Diabetic foot ulcer	Ensure that the vascular supply is adequate. Control infection. Redistribute plantar pressure.

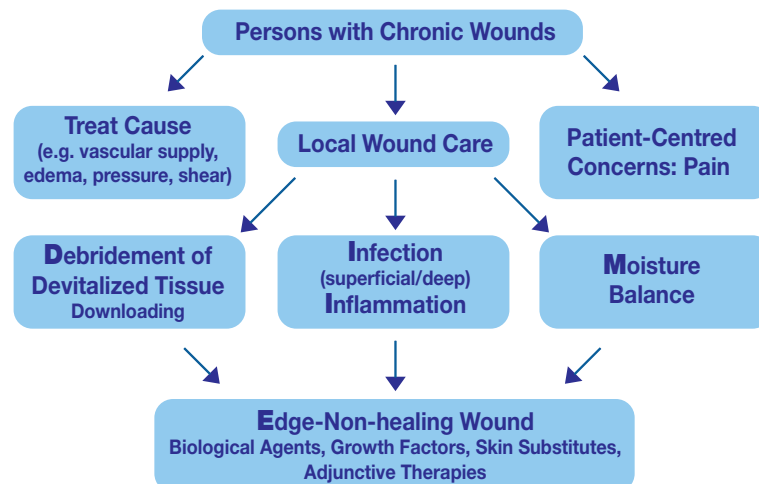
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**Laurie Goodman** is a nurse clinician at the Skin & Wound Care Credit Valley Hospital in Mississauga, Ontario.

FIGURE 1

**Wound bed preparation paradigm**





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treatments for the causes of various wounds.

A maintenance wound is defined as a healable wound with healthcare system problems for delivery of services, or a non-healable chronic wound that is not deteriorating. In non-healable wounds, moisture balance and active debridement are contraindicated; however, the use of topical antiseptics has been shown to decrease local bacterial counts.

Antiseptic agents that can be used for non-healable

wounds (where cytotoxicity is less important than antimicrobial action) include chlorhexidine, povidone iodine, crystal violet/methylene blue and acetic acid.

### Pain and wound healing

Kevin Woo noted that chronic wounds are indeed quite painful. The following data have been compiled regarding chronic wounds and patient pain.

- Leg ulcers: 65–83% of patients with arterial ulcers reported pain.<sup>1</sup>
- Pressure ulcers: 84% of patients reported pain at rest; 88% reported pain with dressing changes.<sup>2</sup>
- Diabetic foot ulcers: 75% of patients reported painful symptoms.<sup>3</sup>

There are 2 main triggers of wound pain: wound-related triggers (e.g. underlying pathology, infection, inflammation) and procedure-related triggers (e.g. debridement, dressing removal, cleansing, repositioning).

Arterial ulcer pain can be classified in the following 3 ways:

- Nociceptive: inflammatory response, local infection, gangrene, claudication, vasospasm.
- Neuropathic: nerve damage, local ischemia, diabetes, trauma.
- Iatrogenic: dressing changes, debridement, retention bandages.

Venous ulcer pain can be classified in the following 3 ways:

- Nociceptive: edema, eczema, lipodermatosclerosis, phlebitis, atrophie blanche, local infection.
- Neuropathic: nerve damage, local ischemia.
- Iatrogenic: dressing changes, compression bandages.

Diabetic foot ulcer pain can be classified in the following 3 ways:

- Inflammatory response, local infection, local trauma (Charcot).
- Neuropathic: nerve damage, local ischemia, cramps, autonomic dysfunction.
- Iatrogenic: cast/shoe/footwear, dressing changes, debridement.

Pressure ulcer pain can be classified in the following 3 ways:

- Inflammatory response, local infection, local trauma (shear, friction), chemical irritation (incontinence), deep tissue injury.
- Neuropathic: nerve damage, local ischemia.
- Iatrogenic: patient positioning, dressing changes, debridement.

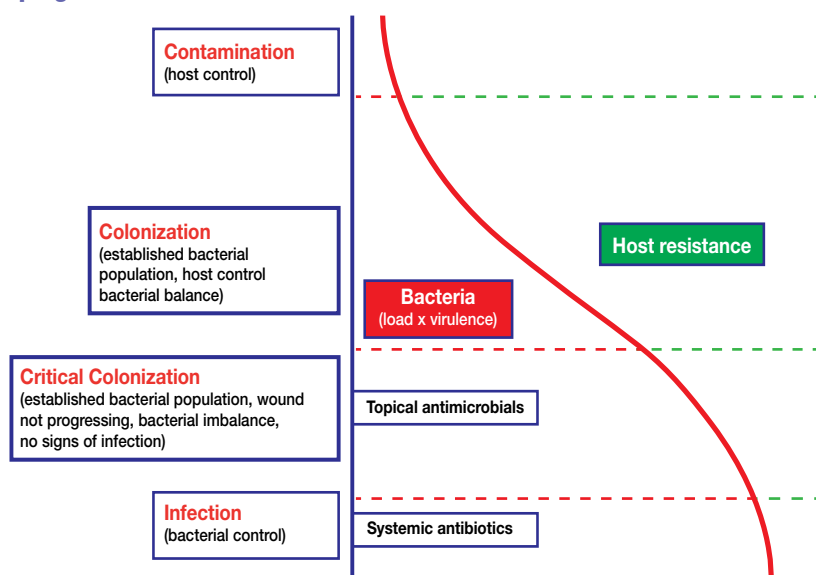
TABLE 2

### Strategies and objectives for pain management

Strategy	Objectives
Education	<p>Web-based learning</p> <p>Face-to-face education:</p> <ul style="list-style-type: none"> <li>• Explain mechanism of pain</li> <li>• Dispel misconceptions about pain</li> <li>• Address concerns about addiction</li> <li>• Emphasize the availability of multiple strategies</li> </ul>
Pharmacological	<p>Topical:</p> <ul style="list-style-type: none"> <li>• Ibuprofen (dressing)</li> <li>• Morphine</li> <li>• Lidocaine</li> </ul> <p>Systemic:</p> <ul style="list-style-type: none"> <li>• Nociceptive pain: ASA, NSAIDs, acetaminophen for mild to moderate pain</li> <li>• Opioids for moderate to intense pain</li> <li>• Neuropathic pain: SNRIs, anticonvulsants</li> </ul>
Local wound care	<p>Atraumatic interface (silicone)</p> <p>Sequester: remove inflammatory mediators</p> <p>Protect periwound skin</p> <p>Treat infections</p>
Anxiety reduction	<p>Relaxation</p> <p>Imagery</p> <p>Distraction</p> <p>Education</p> <p>Music therapy</p> <p>Support groups</p>
Cognitive therapy	<p>Cognitive behavioural therapy</p> <p>Problem-solving skills</p> <p>Positive thinking</p>
Therapeutic alliance	<p>Communication techniques (e.g. reflective listening)</p> <p>Goal-setting</p> <p>Align expectations</p> <p>Demonstrate sympathy</p>
Empowerment	<p>Allow the individual to call “time out”</p> <p>Respect an individual's choices</p> <p>Maximize autonomy: active participation</p> <p>Functional focused therapy</p>

ASA, acetylsalicylic acid; NSAID, non-steroidal anti-inflammatory drug; SNRI, serotonin–norepinephrine reuptake inhibitor

FIGURE 2

**Microbial progression in wounds**

With respect to pain and trauma, it has been demonstrated that patients find dressing cleaning most painful, followed by dressing removal and dressing reapplication. A number of approaches can be taken for evaluating, managing and preventing pain (Table 2). Psychological stress regarding pain is an under-addressed issue in wound care, Woo said. "It's important to understand how stress can suppress the immune system, and how it may affect wound healing." Clearly, he added, this is a subject that requires further study.

**Local wound care**

Laurie Goodman said that wounds should be cleansed and their characteristics assessed, and they should also be monitored. The provision of local wound care follows the mnemonic DIM+E:

- **D**ebride healable wounds (conservative for non-healable, maintenance wounds).
- Treat critical colonization: **I**nfection, persistent inflammation.
- Achieve **M**oisture balance.
- Consider advanced therapies (**E**dge) for healable but stalled chronic wounds.

Debridement options for healable wounds are listed in Table 3. A review published in 2009 found that sharp debridement is the most clinically and cost-effective way of physically removing and suppressing biofilms.<sup>4</sup> A retrospective review by Cardinal and colleagues of 366 venous leg ulcers and 310 diabetic foot ulcers over the course of 12 weeks found that venous leg ulcers had a significantly higher median wound sur-

face area reduction with surgical debridement vs. no surgical debridement (34%,  $p=0.019$ ).<sup>5</sup>

The importance of moist, interactive wound healing cannot be stressed enough, said Goodman. Dressing choices include foams, Hydrofiber, calcium alginate, acrylic dressings, hydrocolloids, films and hydrogels.

**Antimicrobial dressings**

Sibbald noted that the microbial progression of wounds progresses along the following course (Figure 2): contamination, colonization, critical colonization and infection.

TABLE 3

**Debridement options for healable wounds**

Wound type	Debridement options
Surgical	Sharp Conservative Hydro-Jet
Autolytic	Hydrogels Hydrocolloids Alginates
Biological	Maggots Larvae
Mechanical	Wet to dry Whirlpool Ultrasound Water stream
Chemical/enzymatic	Collagenase

## *Sharp debridement is the most clinically and cost-effective way of physically removing and suppressing biofilms.*

There are 4 categories of antimicrobial dressings: honey, slow-release iodine, silver and polyhexamethylene biguanide (PHMB).

### **Honey**

A Cochrane review regarding the use of honey indicated that, with respect to venous leg ulcers, honey as an adjuvant to compression does not significantly increase leg ulcer healing at 12 weeks. With respect to superficial and partial thickness burns, honey may improve healing times in mild to moderate superficial and partial thickness burns, compared with conventional dressings.<sup>6</sup>

### **Slow-release iodine**

Ten trials have been conducted regarding the use of cadexomer iodine for the treatment of venous leg ulcers. In one study, ulcer healing at 6 weeks was better with cadexomer than with standard care (not involving compression). A second study involving compression plus cadexomer vs. standard care showed similar results. Indeed, daily and weekly healing rates in these trials favoured cadexomer iodine.<sup>7</sup>

### **Silver**

Silver remains an effective agent in the treatment of non-healing wounds. In a meta-analysis of the effectiveness of silver-releasing dressings in the management of non-healing chronic wounds, compared with alternatives, silver dressings significantly<sup>8</sup>:

- improved wound healing;
- reduced odour;
- decreased pain-related symptoms; and
- decreased wound exudate.

In addition, silver dressings demonstrated a prolonged dressing wear time, compared with alternative wound management approaches.

### **PHMB**

PHMB foam vs. foam alone has been shown to improve wound healing and provide enhanced pain control.

### **Integration of evidence-based wound care**

Goodman said the 3 tenets of evidence-based wound care are as follows:

1. Provide adequate wound assessment and client assessment.

2. Treat the cause of the wound.
3. Provide local wound healing (i.e. dressings).

She further noted that with the use of evidence-informed practice, interprofessional teams and health-care system support, the costs of providing optimal therapy within the community could be much lowered. Moreover, healing rates would improve and the number of nursing visits, infection rates and incidence of amputation would decrease.<sup>9</sup>

### **Conclusions**

The following key points were addressed during this interesting and informative session. With respect to wounds and wound bed preparation, clinicians should:

- Treat the primary cause of the wound and address patient-centred concerns, including pain.
- Understand the differences between healable, non-healable and maintenance wounds as part of wound bed preparation.
- Optimize local wound care (i.e. know when to debride, differentiate between infection and inflammation, and ensure moisture balance).
- Once a diagnosis is made, understand the difference between superficial critical colonization and deep infection, and treat with appropriate antimicrobials. ☞

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