Principles of Acute Wounds:

Understanding the basic tenets of acute wounds and their management

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Stephan Landis works out of Guelph General Hospital in Guelph, Ontario.

This plenary session of the CAWC conference set the stage by offering attendees basic principles of wound care in various settings. It also addressed the issue of how acute wounds impact the healthcare system globally.

How are acute wounds different from chronic wounds?

David Keast began by outlining the 4 stages of healing of acute skin wounds: 1) hemostasis; 2) inflammation; 3) repair; and 4) remodelling. During this process the wound bioburden is controlled, which in turn limits inflammation. The problem, said Keast, is that "acute wounds can get 'stuck' in the chronic inflammation phase and fail to move into the repair phase." Furthermore, the products of inflammation – i.e. proteases (enzymes that help break down proteins and tissue) and reactive oxygen species – destroy the proteins that are essential for healing; this results in impaired healing.

Both planktonic and biofilm bacteria contribute to chronic inflammation – this remains one of the most common causes of non-healing wounds. Hence, biofilm-based wound care and wound bed preparation can help move chronic wounds into a healing status.

The stages of molecular and cellular events in skin wound healing are as follows: 1) clotting; 2) vascular response; 3) inflammation; 4) scar formation; 5) epithelial healing; 6) contraction; and 7) scar remodeling.[1] Hemostasis, inflammation and remodelling occur in conjunction with each other, but some stages start a little later and last longer. Thus, said Keast, "The process is not sequential; a wound can be in various stages simultaneously."

Keast finished his talk by noting that the hypothesis regarding chronic wound pathophysiology is that repeated tissue injury, ischemia and bacterial growth (planktonic and biofilm) result in a chronic, non-healing wound.

The burden of open surgical wounds

Connie Harris, using data provided by Corrine McIsaac of Health Outcomes Worldwide, said the most common types of wounds seen in community care in Canada are surgical. Indeed, in the province of Ontario, the most common reason for a surgical nursing visit in 2004 was postoperative cellulitis; however, surgical site infections accounted for 20% of home care visits.[2]

A study conducted in the UK found that the costs of treating surgical site infections amounted to £57 million in 2008 (CAN$90 million). "Clearly, the consequences of surgical wounds present a huge financial burden to international healthcare systems," said Harris.

According to data from Health Outcomes Worldwide, dry gauze is the primary treatment used in the community for all wounds, with 24% of surgical wounds treated in this manner.[2] This is a problem, said Harris, as it is not considered the optimal therapy for such wounds. In the SouthWest Regional Wound Care Initiative, she said, nurses and surgeons have worked together to develop a dressing selection guide for surgical open wounds: the "Daily Visits as Exceptional Situation" document. This document is based on the principles of collaboration and is meant to improve:

- human resource utilization;
- capacity in a time of nursing shortage;
- medical supply utilization; and
- patient pain.

Wound care in the emergency department

Lorne Wiesenfeld began by noting that emergency department clinicians strive to provide evidence-based care for patients who present with acute wounds and have an opportunity to positively impact wound care. However, he said, this is sometimes offset by lack of knowledge, insufficient resources and competing demands in the emergency department.

Common wounds seen in the emergency department include:

- diabetic foot ulcers;
- infected lacerations;
- acute lacerations;
- burns;

- chronic leg ulcers;
- pilonidal or perianal abscesses;
- subcutaneous abscesses;
- postoperative wounds; and
- infected pressure ulcers.

Dr. Wiesenfeld said that, in his healthcare institution, there is a true team approach between the emergency department staff and community staff (e.g. enterostomal nurses). Such an approach provides an optimal environment to ensure ongoing wound management and wound healing. "We need to work together as a multidisciplinary team," he said, "to ensure that all patients receive optimal care, and that the wound is addressed properly and heals in as timely a fashion as possible, given the wound and patient characteristics."

Why are skin tears a problem?

Kim LeBlanc began by saying, "People often think skin tears aren't a problem…no one really thinks about acute wounds." However, she continued, if skin tears are not managed appropriately, they can become very complex chronic wounds and cause undue suffering to the patient.

A review of the literature on skin tears reveals the following key data:

- Malone and colleagues estimated there are 1.5 million skin tears per year in institutionalized adults in the US.[3]
- Everett and Powell reported a 41.5% prevalence of skin tears in a 347-bed facility in Western Australia.[4]
- Carville and Lewin reported a skin tear prevalence of approximately 5.5% in known wounds among all age groups in community settings.[5]
- Carville and Smith reported skin tears in 20% of known wounds in the war veteran population.[6]
- Carville and colleagues reported that skin tears are common wounds and occur more frequently than pressure ulcers.[7]

LeBlanc and Christensen conducted a prevalence study in a Canadian long-term care facility, and found a skin tear prevalence rate of 22%.[8] "This is much higher than the prevalence rate of pressure ulcers, which receive considerable attention in the clinical wound care field," said LeBlanc.

The online survey conducted by LeBlanc and Christensen was completed by 1,127 healthcare professionals from 16 countries.[8] The following responses were recorded:

- More than half (69.6%) of respondents reported a problem with current assessment and documentation of skin tears in their practice settings.
- The majority (89.5%) of respondents favoured a simplified method for documenting and assessing skin tears.

Both planktonic and biofilm bacteria contribute to chronic inflammation status – this remains one of the most common causes of non-healing wounds.

- 80.9% of respondents admitted to not using any tool or classification system for assessing and documenting skin tears.
- 68% of respondents felt there was a problem with skin tear assessment and documentation in their healthcare setting.
- 90% of respondents indicated that they would like a more simplistic method of documenting skin tears.
- 80% of respondents said their healthcare institution did not use any scale or classification system for documenting skin tears.

Although people generally think of skin tears as an issue confined to the elderly population, LeBlanc said they can occur in the very young and the very old. Because skin tears are not well-documented, their incidence and the healthcare costs associated with treating them are unknown. Skin tear prevention programs – particularly in the long-term care setting – are badly needed.

Acute wound infection

Stephan Landis said infections are a major issue in the acute wound setting because of bacteria formation, which competes with the local wound environment.

"Bacteria seek niches to prosper," said Landis, "and they do a very good job of it!" An acute wound provides an optimal environment for bacteria to grow, persist and develop microbial resistance. Much of this sequence of events is predictable and some, but not all, is measurable.

Landis addressed microbial outcomes in acute wounds and noted that perioperative antibiotics, "clean" surgery, good surgical technique and measured postoperative care can result in a wound remaining uninfected. Conversely, if microbes can invade the host at the wound site, then they can cause infection. This is often the result of a pathovirulent organism, 'dirty' surgery, abscess formation, wound dehiscence, septicemia (in burns) or poor protoplasm.

If a biofilm is established, this can lead to wound chronicity and result in foreign body infection, osteomyelitis, devitalized tissue and, ultimately, poor healing capacity. However, Landis said, "In complex wounds at the bedside, the diagnostic capabilities of identifying biofilm are undergoing an evolution. In the future we'll know much more about this area of knowledge, based on research that is currently being conducted."

For references, please see page 17.