

Clinical Biofilms: A Challenging Frontier in Wound Care

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Key Highlights:

- Biofilms have been linked to a variety of wound complications and may be a precursor to infection.
- Biofilms are tolerant to external agents such as antibiotics and antiseptics, and impair key healing processes such as inflammatory response, formation of granulation tissue, and epithelialisation.
- Inadequate control of moisture and exudate within a wound environment can lead to biofilm development; obtaining moisture balance in the wound is essential for reducing the opportunity for biofilms to develop and optimising healing.
- Observation of biofilm in complex chronic wounds is difficult, and requires a trained clinical eye if visible, or technical, expensive equipment if microscopic. However, in long-term urinary catheters, biofilm is easily visible and has been directly associated with an increased infection rate. Similarly, biofilm detection in other types of wounds is a first step towards improved patient care.
- Specifically with regards to wound biofilm, the literature suggests:
 - The capacity of biofilm formation to predict delayed healing may increase in subjects with conditions such as impaired arterial or venous circulation or diabetes.
 - Wound surface biofilm may serve as an early signal to alert clinicians that wound healing is not leading to reduced wound contraction within 2-4 weeks of treatment.
 - Early detection of biofilm may identify at-risk patients and enable intervention before recalcitrance and/or infection becomes a problem.
- Following the literature review and analysis, the authors developed a mind map to explore the interrelated causes of delayed healing and infection, and the factors of both the host and wound environment that increase the predictive and diagnostic validity of biofilm for early screening of patients at risk of delayed healing or wound infection.
- Additional research is needed to identify a technique that can identify and characterise biofilms and clarify risk factors for biofilm formation. This will help establish the importance of biofilm in guiding clinical practice in non-healing and/or infected wounds.

Methods:

- Literature searches conducted of relevant terms reviewed biofilm definitions and reliability and/or validation of their role in accurately predicting infection, or diagnosing or predicting documented delayed healing.
- The authors searched the MEDLINE, CINAHL, and Scopus literature databases from 1966 to January 10, 2014 for articles containing the term “biofilm” combined with the terms “wound infection” or “wound healing”.
- Studies were grouped into the following brackets and reviewed to extract the key learnings: biofilm and wound infection, biofilm and wound healing, biofilm and moisture, and diagnostic validity of wound biofilm.

References:

1. Hurlow, J., Couch, K., Laforet, K., Bolton, L., Metcalf, D., Bowler, P. Clinical Biofilms: A Challenging Frontier in Wound Care. *Advances in Wound Care*, DOI: 10.1089/wound.2014.0567.