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TECHNICAL BULLETIN: Skin and Soft Tissue Infection (SSTI) Panel

The fact that most skin and soft tissue infections are produced as a result of trauma, surgical incision, bites, burns, diabetic foot ulcers, etc. and inevitably contain microorganisms is well established. Most heal rapidly if blood perfusion is optimized where oxygen, nutrients, and host defense cells are effectively delivered to the infection site. Infection and its root cause is thought to occur because of organism density or the presence of specific 'pathogens'. However, other thoughts suggest that the population of microorganisms is of little significance in delaying the process of wound healing. Therefore, it is probable that multiple factors, some of which are not fully understood, are involved in the step-wise progression and severity of infection; contamination, colonization, localized infection, spreading infection and systemic symptoms.[1]

Clinical presentation is critical in diagnosing skin and soft tissue infection regardless of the stage. Specific scoring criteria, characterized in broad categories, has been developed for acute tissue infections, such as surgical site infections. However, a similar approach for chronic or more 'complex' tissue infection is not well established.[2]

"Clinicians should act promptly if a patient with a tissue infection shows signs of it becoming more severe, e.g. sepsis or extensive tissue necrosis (necrotizing fasciitis or gas gangrene)".[1] With that in mind, there is often overlap of symptoms as tissue infections progress from the acute to chronic phases. This is particularly true in patients with diabetic foot ulcers, venous leg ulcers, arterial leg/foot ulcers or pressure ulcers. Tissue breakdown in and around the infection, erythema extending from the edge of the wound, crepitus, warmth, induration or discoloration spreading into the surrounding tissues, involvement of regional lymph nodes, and malaise or other non-specific deterioration in the patient's physical condition are potential signs of the infection spreading with unpredictable outcomes. The symptoms may not always be as obvious in patients who are immunocompromised or have sensory neuropathy.[3]

Clinical judgment is a critical part of tissue infection management, but a comprehensive approach to identifying the bacteria present can support and guide the management of complex skin and soft tissue infections. Consequently, incorporation of molecular technology such as TEM-PCR™ *(Target Enriched Multiplex Polymerase Chain Reaction)* in the diagnostic workup can provide meaningful information to better manage complex tissue infections.[4]

Molecular technology can successfully elucidate those organisms that are associated with aggressive and difficult to treat infections, as well as those that are a challenge to isolate and identify with conventional diagnostic techniques such as culture. For example, *Clostridium* species are obligate anaerobic bacteria that require special precautions in collection and transport that are essential for any successful attempt to identify these organisms in culture. Bacterial viability is unimportant in molecular technology where unique gene sequences are the basis of identification; viable or not. The SSTI Panel targets shown in Table 1 are those that provide clinically relevant diagnostic information. Other available molecular technologies now often detect organisms that are of questionable clinical significance and may form the basis of misguided and inappropriate antimicrobial use.

Table 1: Diatherix Eurofins Skin and Soft Tissue Infection Panel

Acinetobacter baumannii	*Escherichia coli*
Bacteroides spp.	*Kingella kingae*
Citrobacter freundii	*Pseudomonas aeruginosa*
Clostridium novyi/septicum	*Staphylococcus aureus*
Clostridium perfringens	MRSA[1]
Enterobacter aerogenes	PVL[2] gene
Enterobacter cloacae	*Staphylococcus lugdunensis*
Enterococcus faecalis	*Streptococcus pyogenes* (Group A)
Enterococcus faecium	
Vancomycin-resistant enterococcus	

[1] Methicillin-resistant Staphylococcus aureus
[2] Panton-Valentine leukocidin

Specimen Collection Overview for SSTIs:

The SSTI Panel is designed to assist the physician with the management of either acute or chronic infections. It is important to emphasize that the focus of this panel is to detect those organisms that may be implicated in a more pathogenic role. Specifically, the attention is on those organisms that produce tissue necrosis, adjacent cellulitis, gas in tissue, or systemic symptoms. The relevance of superficial sampling of chronic wounds that are open and draining should be questioned. The value of culture results from such collection attempts, and the treatment based on the results of the associated tests, is an issue of continual debate. Results from poorly managed and indiscriminant sampling may not be relevant. For that reason, effective debridement of the infection to remove surface contamination and biofilms is essential. Imaging assisted collection techniques (such as ultrasound or CT guided aspiration) from loculated areas of the infection are recommended to obtain meaningful and actionable test results that are representative of the infectious process.[5]

Recent advances in skin and soft tissue infection care techniques underscore the importance of effective debridement as part of a successful management strategy. The physical disruption of any biofilms that may be present provides a 'window of opportunity' where antimicrobial therapy may be more effective when using established guidelines.[6] Equally important in the debridement process is the removal of bacteria from devitalized tissues that typically harbor organisms and often carry multiple resistance mechanisms. These opportunistic colonizers are the typical gram-negative organisms that are easily transferred to patients in adjacent hospital beds or carried on the hands of healthcare workers to multiple locations within the continuum of care. Cultures obtained from these devitalized tissues often produce test results that are difficult to interpret and lead to misguided antimicrobial therapy, thus promoting antibiotic pressure and contributing to the development of additional antibiotic resistance mechanisms.[7, 8]

Ideally, specimens collected for testing with this panel are aspirates of purulent material that are free of surface contamination. Between 0.5 and 1.0 ml of a suitable aspirate can be placed into the Copan tube, which includes the transport media, and submitted for testing. If little or no fluid is available, a flocked swab can be introduced into exposed sinus cavities or other representative areas deep in tissues that are free of surface contamination. Use of molecular technology, coupled with effective specimen collection protocols, provides clinically relevant information for the effective management of SSTIs in both the routine clinical and healthcare delivery system environments.

References:

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