

MEDICAL CENTER

Protocol: Burn Wound Infection Diagnosis & Treatment

Category

Clinical Practice

Approval Date

September 28, 2020

Due for review

September 28, 2022

Applicable to							
<input checked="" type="checkbox"/> VUH	<input checked="" type="checkbox"/> VCH	<input type="checkbox"/> DOT	I. VMG Off-site locations	I. VMG	– VPH	1. Other	
Team Members Performing							
1. All faculty & staff	<input checked="" type="checkbox"/> Faculty & staff providing direct patient care or contact	<input checked="" type="checkbox"/> MD	<input checked="" type="checkbox"/> House Staff	<input type="checkbox"/> APRN/PA	<input type="checkbox"/> RN	<input type="checkbox"/> LPN	
2. Other:							
Content Experts							
Steve Gondek, MD							

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Types of burn wound infection¹:

- II. Burn wound impetigo
 - Involves a loss of epithelium of previously re-epithelialized surface, not related to inadequate excision, mechanical disruption, or hematoma; AND requires a change in antimicrobial therapy (topical and/or systemic)
- III. Open burn-related surgical wound infection
 - Occurs in surgically created wounds that have not yet re-epithelialized; has the appearance of infection per the physician; is culture positive; requires a change in antimicrobial therapy (topical and/or systemic)
- IV. Burn wound cellulitis
 - Occurs in uninjured skin surrounding the burn wound or donor site; is associated with erythema, swelling, and pain beyond what is expected from normal inflammation; may be associated with systemic signs of infection; requires a change in antimicrobial therapy
- V. Invasive infection of unexcised burn wounds
 - Occurs in unexcised deep partial or full thickness burns; is associated with a change in burn wound appearance or character; requires surgical excision of the burn and treatment with systemic antimicrobial therapy

Diagnosis of burn wound infection² at Vanderbilt University Medical Center:

Establishing the presence or absence of burn wound infection is difficult and requires clinical judgement. Burn wounds are consistently colonized and cultures without clinical symptoms are clearly misleading. However, quantitative cultures obtained from the same patient can have a high degree of variability. Thus, judgement is required.

Diagnosis of a burn wound infection at VUMC requires both symptoms and culture data.

- II. Subjective
 - a. Pain, erythema, color changes
 - b. Unexpected change in appearance or depth of burn wound
 - c. Systemic signs of infection
 - d. Premature separation of burn eschar
- III. Objective
 - a. Biopsy (Touch Prep $\geq 10^5$ followed by positive culture)
 - b. Swab (Gram stain followed by positive culture)
- IV. Interpretation and utilization of culture data:
 - Antibiotics should be narrowed to cover the pathogens isolated in culture
 - If touch prep and culture techniques do not support an active invasive infection, consideration should be given to discontinue antibiotics.

- Biopsy results with negative touch prep suggests $<10^5$ CFUs
- Culture swabs without growth are considered negative and therapy should be adjusted accordingly
- If continuing antibiotics with negative culture techniques, documentation of the rationale should be included.

A burn wound culture may be obtained in one of two ways. Wound culture should be performed at the discretion of the burn surgeon in charge of the patient's care.

Option 1, Touch Prep and culture

2. A tissue biopsy (punch or excisional) is performed while the patient is undergoing wound care or in the operating room
3. Tissue is immediately sent "fresh" to the microbiology lab
4. If touch prep is positive, can be assumed that the bacterial count is $\geq 10^5$, and a culture will be performed

Option 2, Gram Stain and Culture

3. Two swabs of the area of concern will be performed
4. One swab will be inserted into the culture tube and sent for culture
5. One swab will be sent "fresh" for gram stain

Treatment of burn wound infection:

I. Non-invasive infection

- a. Definition: A diagnosed infection of an unexcised burn wound, graft, or donor site (but isolated to one area of the body if multiple wounds exist) based on the above criteria without systemic signs or symptoms of infection (new fever, increasing tachycardia, elevated white blood cell count, thrombocytopenia or thrombocytosis, sepsis or septic shock etc.).
- b. Treatment: First line treatment is adjustment of topical antimicrobial therapy to cover the most common causes of burn wound infection (Pseudomonas, Staph aureus, MRSA, etc.). In most cases, this will be 2.5% Mafenide solution applied q8 hours. If the patient is currently in Mafenide solution or if there is not improvement in the clinical appearance of the wound after 24 hours of therapy, systemic antibiotics should be started. Antibiotic therapy should be narrowed to cover the pathogens isolated from the wound culture once that data becomes available.
- c. Special cases: If fungal infection is suspected, this should be confirmed on culture and appropriate systemic therapy should be started in addition to adjusting the topical therapy to include fungal coverage (most commonly, adding Nystatin to the Mafenide solution) regardless of systemic signs/symptoms.

- d. Cessation of systemic antibiotics: In the setting of a positive culture, antibiotics should be continued for a minimum of 7 days or until healing has begun (donor sites healing or grafts taking and filling in). If the culture is ultimately negative, antibiotics should be stopped once the culture is finalized.

II. Invasive infection

- a. Definition: A diagnosed infection of unexcised burn wound, graft, or donor site not isolated to one area of the body and/or with systemic signs and symptoms of infection.
- b. Treatment: Adjustment of topical antimicrobial therapy to cover the most common causes of burn wound infection (*Pseudomonas*, *Staph aureus*, MRSA, etc.). In most cases, this will be 2.5% Mafenide solution applied q8 hours. If a fungal infection is suspected, topical antimicrobials should be adjusted to cover that infection (e.g. addition of Nystatin to the soaks). Broad spectrum antibiotic therapy should also be started and continued until culture data is available. Antibiotic therapy should be narrowed to cover the pathogens isolated from the wound culture once that data becomes available.
- c. Cessation of systemic antibiotics: Antibiotics should be continued for a minimum of 7 days or until healing has begun (donor sites healing or grafts taking and filling in). If the culture is ultimately negative, antibiotics should be stopped once the culture is finalized.

REFERENCES

1. Peck MD, Weber J, McManus A, Sheridan R, Heimbach D. Surveillance of burn wound infections: a proposal for definitions. *The Journal of burn care & rehabilitation*. 1998;19(5):386-389.
2. Greenhalgh DG, Saffle JR, Holmes JH, et al. American Burn Association consensus conference to define sepsis and infection in burns. *Journal of burn care & research : official publication of the American Burn Association*. 2007;28(6):776-790.