### Guideline/Protocol Title:
UCSF Medical Center Guideline for the Management of Suspected Skin and Soft Tissue Infections in Adults

### Original Author(s):
Jennifer S. Mulliken, MD and Sarah M. Doernberg, MD, MAS

### Collaborator(s):
Zlatan Coralic, PharmD; Christopher Fee, MD; Steve Grapentine, PharmD; Anna Haemel, MD; Lucy Kornblith, MD; Andrew Lai, MD, MPH; Sara Murray, MD, MAS; Lynn Nguyen, PharmD; Katie Raffel, MD; Alex Reyzelman, DPM

### Approving committee(s):
Skin and Soft Tissue Infection Guideline committee included representation from Infectious Diseases (ID), Antimicrobial Stewardship, Pharmacy, Hospital Medicine, Dermatology, Critical Care/Critical Care Surgery, Vascular Surgery/Podiatry, and Emergency Medicine

### P&T Approval Date:
October 21, 2019

### Last revision Date:
September 6, 2019

### PURPOSE/SCOPE:
- This guideline establishes evidence-based consensus standards for management of suspected skin and soft tissue infections (SSTI) among adult outpatients and hospitalized inpatients at UCSF Medical Center.
- This guideline is based on review of national guidelines, primary literature, and the multi-disciplinary perspectives of experienced providers at UCSF Medical Center.
- Practice guidelines are intended to assist with clinical decision-making for common situations but cannot replace personalized evaluation and management decisions based on individual patient factors.
- Guidelines will be updated every 2 years

### EXECUTIVE SUMMARY
The SSTI Guideline is presented in four parts as shown in the flowsheets on pages 6-9: management of purulent SSTI, management of non-purulent SSTI, management of lower extremity ulcerative SSTI, and management of recurrent/refractory SSTI.

### BACKGROUND / INTRODUCTION
The SSTI Guideline represents a multi-departmental effort to establish best-practices in the treatment of SSTI, reduce practice variation, and provide a framework to help providers address challenges in the treatment of SSTI. This guideline focuses on antibiotic selection and treatment duration for purulent SSTI, non-purulent SSTI, and ulcerative SSTI. In addition, guidance on the management of recurrent/refractory SSTI is also provided.

### Intended Population:
• **Inclusion:** Outpatients or hospitalized inpatients with suspected SSTI, including non-purulent SSTI, purulent SSTI, necrotizing SSTI, and ulcerative SSTI.

• **Exclusion:** SSTI with underlying hardware, bone/joint infections, bite-associated infections, infections associated with immersion, infections associated with penetrating trauma, orbital/periorbital cellulitis, perianal/perineal/perirectal infections, sacral decubitus ulcer infections, neutropenic patients (ANC < 500), and surgical site infections (superficial, deep, organ space).

**Definitions:**
- Non-purulent SSTI: Cellulitis or erysipelas in the absence of abscess or purulent drainage
- Purulent SSTI: Abscess or cellulitis with pustules
- Ulcerative SSTI: Chronic skin ulceration of the lower limb, including those ulcers associated with diabetes or vascular insufficiency (e.g., peripheral arterial disease, venous insufficiency)
- Recurrent/refractory SSTI: More than 3 occurrences per year of either non-purulent or purulent SSTI

**Diagnosis and Microbiologic Testing:**

**Purulent and Non-Purulent SSTI:**
- Bacterial Gram-stain and culture are recommended for patients who undergo incision and drainage or surgical debridement.
  - Cultures should be obtained, where appropriate, prior to starting empiric antimicrobial therapy in stable patients.
  - Wound swabs do not correlate well with deep cultures and should be avoided
- In the absence of systemic signs of infection, blood cultures are not recommended.
- Consult ID and/or Dermatology if patient is not clinically responding to recommended treatment.
- Imaging is only indicated if a patient is failing therapy (to evaluate for deep abscess) or if there is concern for necrotizing infection. In the latter case, surgery should not be delayed by imaging studies if suspicion is high.

**Ulcerative SSTI:**
- Clinical diagnosis involves at least 2 signs or symptoms of infection (see **Table 1**)
- Classify infection severity based on IDSA/Society for Vascular Surgery (SVS) Wound, Ischemia, and Foot Infection (WIfI) criteria (see **Table 1**)
- Common pathogens:
  - Gram positive cocci (GPCs), especially staphylococci, are the most common pathogens
  - Gram negative rods (*Escherichia coli, Klebsiella pneumoniae, Proteus* spp.) are common co-pathogens in chronic infections or infections following prior antibiotic treatment
  - Anaerobes are not major pathogens in mild to moderate infections; may be co-pathogens in ischemic or necrotic wounds
  - Common pathogens in diabetic foot osteomyelitis:
    - *Staphylococcus aureus, Escherichia coli, Group B Streptococcus* (frequent co-pathogen with *Staph aureus*), *Klebsiella pneumoniae, Proteus* spp. and less commonly *Pseudomonas aeruginosa*
- Obtaining cultures:
  - Cultures should not be sent for clinically uninfected wounds
  - For infected wounds, obtain a deep tissue culture (in the operating room) for aerobic and anaerobic culture. If debridement is not an option, consider obtaining a superficial wound culture. If *Staph aureus* or Group A *Streptococcus* isolated, treat these as pathogens (other bacteria cultured superficially are likely contaminants).
- Obtain cultures prior to starting empiric antibiotics, if possible
- Decisions about remaining infected tissue after debridement should be based on both intra-operative appearance of bone as well as margins on path

<table>
<thead>
<tr>
<th>Reference #</th>
<th>Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

**Revision History**

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Update(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table I: IDSA/SVS WIfI Wound Severity Classification

<table>
<thead>
<tr>
<th>Clinical manifestation of infection</th>
<th>SVS WIfI</th>
<th>IDSA Infection Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>No symptoms or signs of infection</td>
<td>0</td>
<td>Uninfected</td>
</tr>
<tr>
<td>Infection present, as defined by the presence of at least 2 of the following:</td>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>• Local swelling or induration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Erythema &gt;0.5 to ≤2 cm around the ulcer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Local tenderness or pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Local warmth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Purulent discharge (thick, opaque to white, or sanguineous secretion)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local infection involving only the skin and the subcutaneous tissue (without involvement of deeper tissues and without systemic signs as described below) Exclude other causes of an inflammatory response of the skin (e.g., trauma, gout, acute Charcot neuro-osteoarthropathy, fracture, thrombosis, venous stasis)</td>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>Local infection (as described above) with erythema &gt;2 cm, or involving structures deeper than skin and subcutaneous tissues (e.g., abscess, osteomyelitis) and No systemic inflammatory response signs (as described below)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local infection (as described above) with signs of SIRS, as manifested by 2 or more of the following:</td>
<td>3</td>
<td>Severe</td>
</tr>
<tr>
<td>• Temperature &gt;38° or &lt;36°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Heart rate &gt;90 bpm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Respiratory rate &gt;20 breaths/min or PaCO&lt;sub&gt;2&lt;/sub&gt; &lt;32 mm Hg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• WBC &gt;12,000 or &lt;4,000 or 10% bands</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Management of Recurrent SSTI (3 or more episodes/year)

Recurrent Non-purulent SSTI

- Elevate affected area(s)
- Manage predisposing factors:
  - Tinea pedis
  - Edema, lymphedema
  - Cutaneous disorders (i.e., eczema)
  - Venous insufficiency

Do NOT use these guidelines while patient is actively infected

Quality of life significantly impaired by frequency/severity of recurrences?

Outpatient Dermatology referral for confirmation of diagnosis and management of predisposing factors

Outpatient Infectious Diseases referral for consideration of secondary prophylaxis (PO penicillin VK 250mg BID). Penicillin dose may need to be increased in some patients who fail to respond to standard dosing.

Recurrent Purulent SSTI

- Non-pharmacologic interventions (see bottom left)
  - Wash all personal items (sheets, towels, clothes)

Ongoing recurrences?

Intranasal 2% mupirocin BID
PLUS
Daily 4% chlorhexidine baths OR twice weekly dilute bleach baths (1/4 cup per bath)
Duration: 5 consecutive days total

Still having ongoing recurrences?

5 consecutive days/month of intranasal 2% mupirocin
PLUS
5 consecutive days/month of 4% chlorhexidine baths OR twice weekly dilute bleach baths (1/4 cup per bath) for patient and household contacts
Duration: 3 months total

Still having ongoing recurrences?

Outpatient referral to Infectious Diseases for discussion of systemic decolonization

Non-Pharmacologic Interventions for Recurrent Purulent SSTI

Bathing Practices:
- Perform regular bathing, cleaning of hands
- Avoid reusing/sharing personal items (razors, towels)
- Avoid loofahs in the bath or shower

Laundring/Cleaning:
- Wash clothes regularly (bleach/hot water not necessary)
- Regular cleaning of high-touch surfaces (toilets, baths, phones, etc)
- Change towels daily

Skin Care:
- Keep draining wounds covered with clean, dry bandages
- If sharing moisturizer or lotion, use pump or pour formats (not jars)
- Keep fingernails trimmed
Management of Lower Extremity Ulcerative SSTI

Is ulcer infected? 
≥ 2 findings:
- Local swelling or induration
- Erythema around ulcer
- Local tenderness or pain
- Local warmth
- Purulent discharge

Assess infection severity (IDSA/SVS Criteria)

Yes → Inpatient Treatment

Moderate (WII 2)

Start ceftriaxone + vancomycin
Consider debridement and obtain intra-operative culture(s)

If final definitive procedure leaves no remaining infected tissue, complete 3 day course. If persistent infected or necrotic bone, consult ID to assist with final duration of therapy.4

Severe (WII 3)

Start vancomycin + piperacillin/tazobactam2
If concern for necrotizing infection, add clindamycin and consult ID

Obtain intra-operative culture(s)

Start outpatient treatment

Outpatient Treatment

Refer to either purulent or non-purulent outpatient SSTI treatment guidelines as appropriate

Outpatient Treatment

Mid (WII 1)

Start TMP/SMX1
Sulfur allergy: doxycycline
Consider podiatry referral

If improvement? Yes → Complete total 7 day course

Evaluate adherence
- Consider alternative diagnosis (including osteomyelitis)
- Consider admission

No → Modify based on C&S3

Switch to PO TMP/SMX1
Sulfur allergy: doxycycline

Complete additional 7 day course from debridement
If no debridement performed, complete total 7 day course

Contact Antimicrobial Stewardship (on VioLife or via pager 443-9431) if additional assistance with antibiotic selection is desired

Exclusions:
- SSTI Location:
  - Underlying hardware, bone/joint infection, surgical site infection, sacral debridement or ulcer infection, perianal/perineal/perirectal infection

Patient Factors:
- Neutropenia (ANC < 500)
## SSTI Dosing, Non-dialysis

<table>
<thead>
<tr>
<th>Drug</th>
<th>CrCl &gt; 50 mL/min</th>
<th>CrCl 15-50 mL/min</th>
<th>CrCl &lt; 15 mL/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cephalexin</td>
<td>500mg PO TID</td>
<td>250mg PO TID</td>
<td>250mg PO daily</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>300-450mg PO TID</td>
<td>300-450mg PO TID</td>
<td>300-450mg PO TID</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>100mg PO BID</td>
<td>100 mg PO BID</td>
<td>100mg PO BID</td>
</tr>
<tr>
<td>TMP/SMX DS 800/160 mg</td>
<td>40-59kg: 1 DS tab PO BID</td>
<td>60-70kg: 1 DS tab PO TID</td>
<td>&gt;80kg: 2 DS tab PO BID</td>
</tr>
</tbody>
</table>

## SSTI Dosing in Intermittent and Continuous Hemodialysis

<table>
<thead>
<tr>
<th>Drug</th>
<th>Intermittent Hemodialysis</th>
<th>Continuous Renal Replacement Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cephalexin</td>
<td>500mg PO daily (post-HD on HD days)</td>
<td>Use dosage for CrCl&gt;50</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>300mg PO TID</td>
<td>300mg PO TID</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>100mg PO BID</td>
<td>100mg PO BID</td>
</tr>
<tr>
<td>TMP/SMX DS 800/160 mg</td>
<td>2.5-5mg/kg/day TMP component*</td>
<td>5mg/kg/day TMP component*</td>
</tr>
</tbody>
</table>

*Use adjusted body weight