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

Reference #	Citation
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7	Hepburn MJ, Dooley DP, Skidmore PJ, et al. Comparison of short-course (5 days) and standard (10 days) treatment for uncomplicated cellulitis. *Arch Intern Med*. 2004 Aug 9-23;164(15):1669-74.
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13	Miller LG, Daum RS, Creech CB, et al. Clindamycin versus trimethoprim-sulfamethoxazole for uncomplicated skin infections. *N Engl J Med*. 2015 Mar 19;372(12):1093-103.
14	Mills JL, Conte MS, Armstrong DG, et al. The Society for Vascular Surgery Lower Extremity Threatened Limb Classification System: Risk stratification based on Wound, Ischemia, and foot Infection (WIfI). *J Vasc Surg*. 2014 Jan;59(1):220-34.e1-2.

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16	Stevens DL, Bisno AL, Chambers HF, et al. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. *Clin Infect Dis*. 2014 Jul 15;59(2):e10-52.
17	Talan DA, Mower WR, Krishnadasan A, et al. Trimethoprim-Sulfamethoxazole versus Placebo for Uncomplicated Skin Abscess. *N Engl J Med*. 2016 Mar 3;374(9):823-32.
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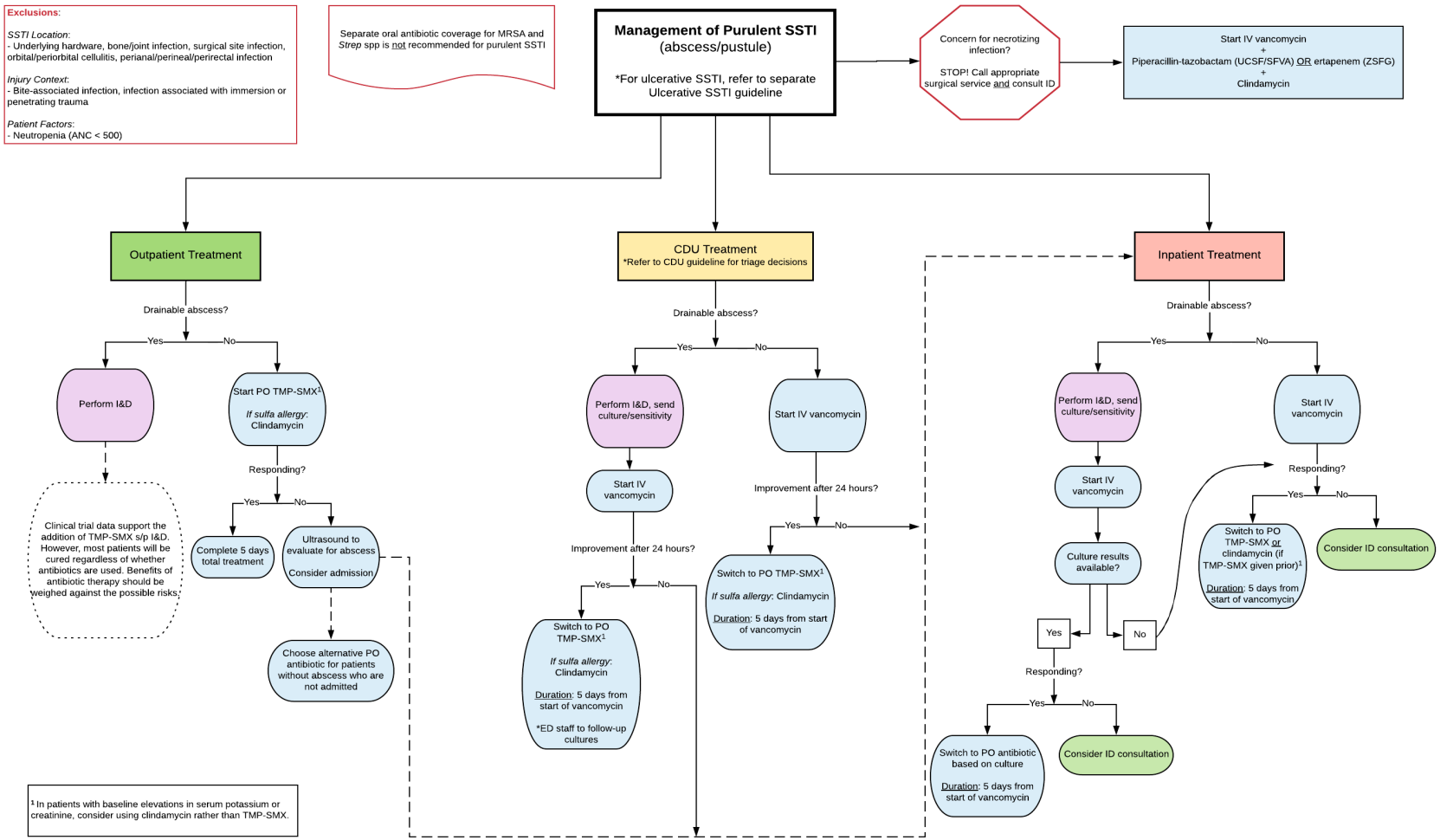
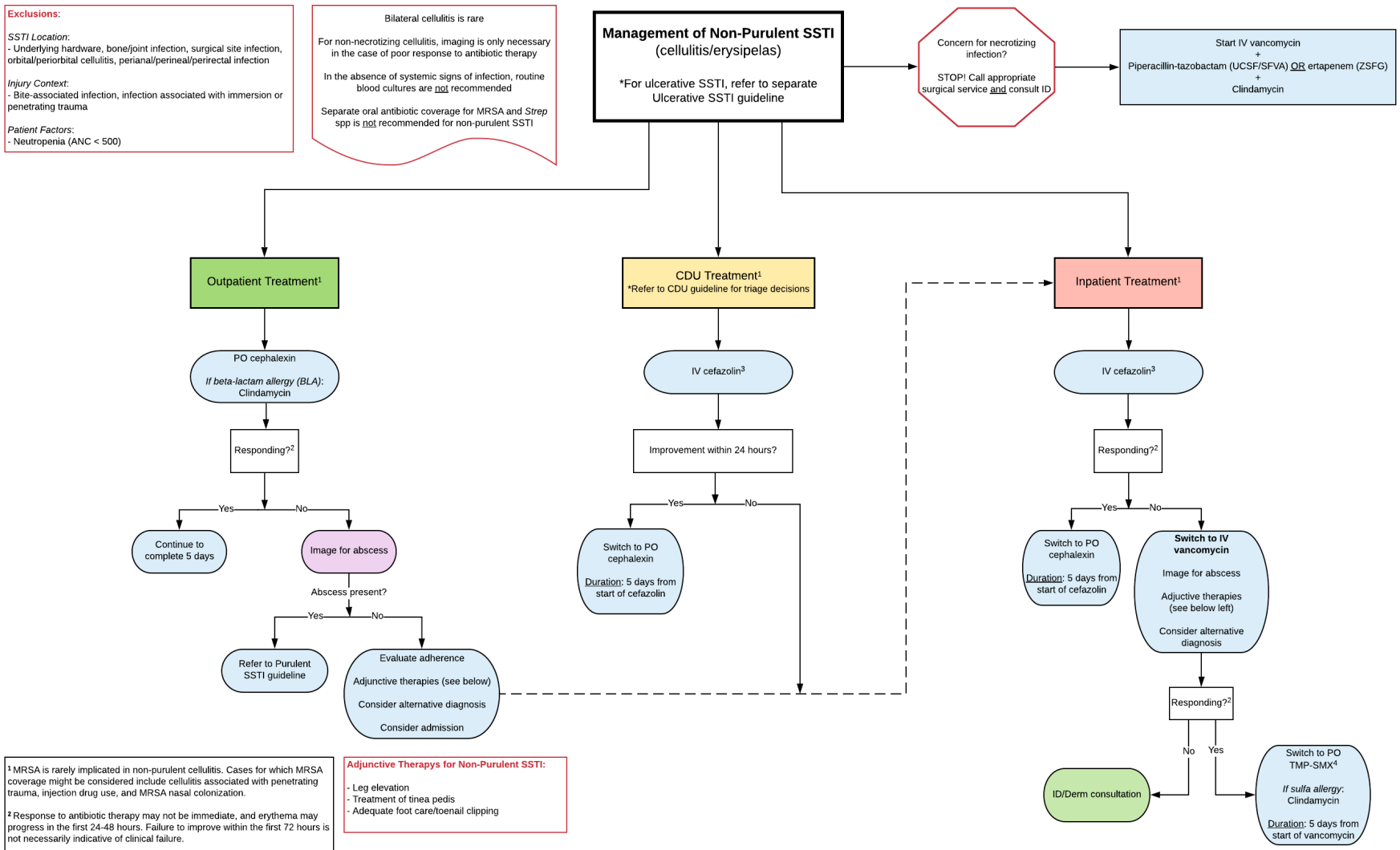
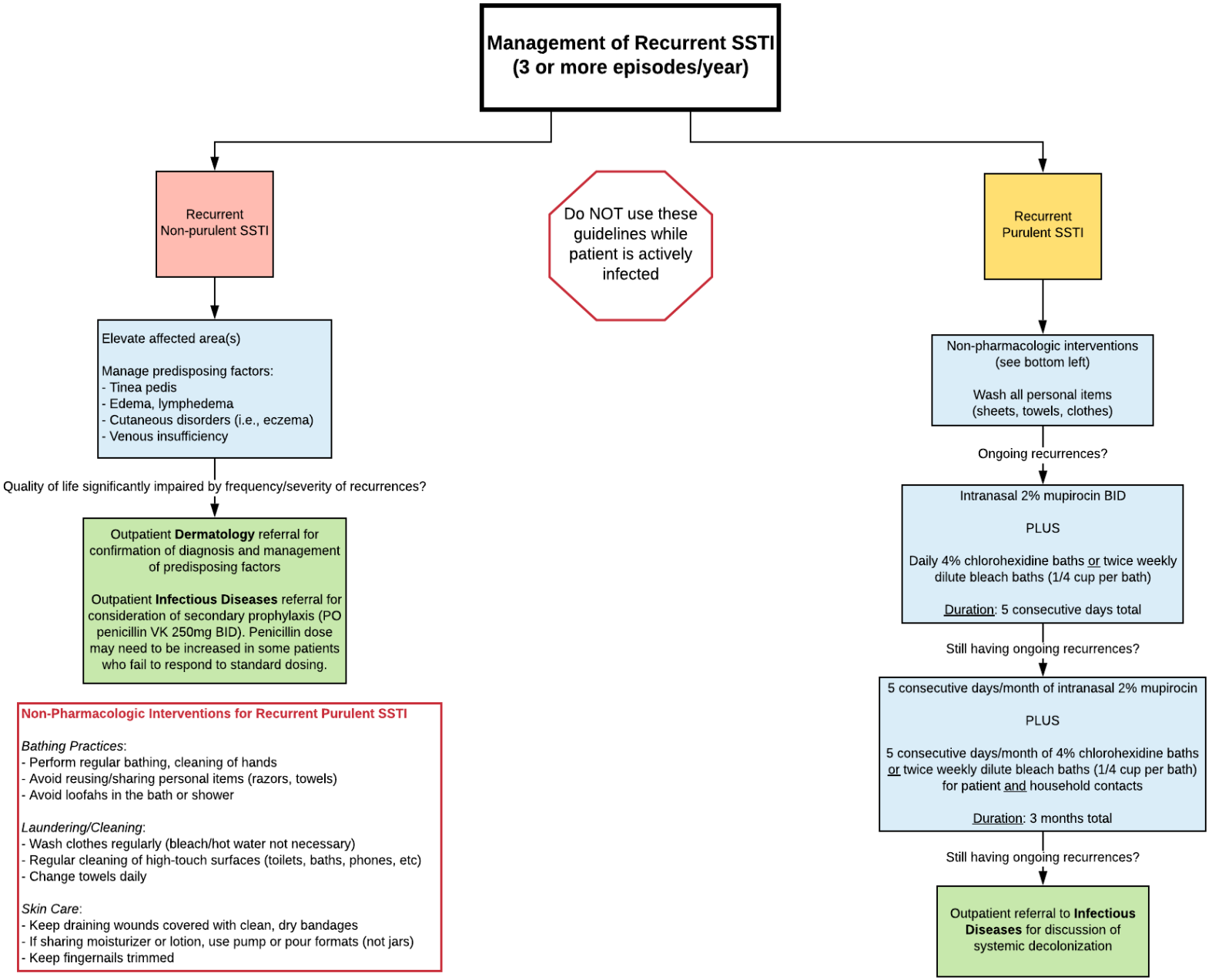
Revision History	
Revision Date	**Update(s)**

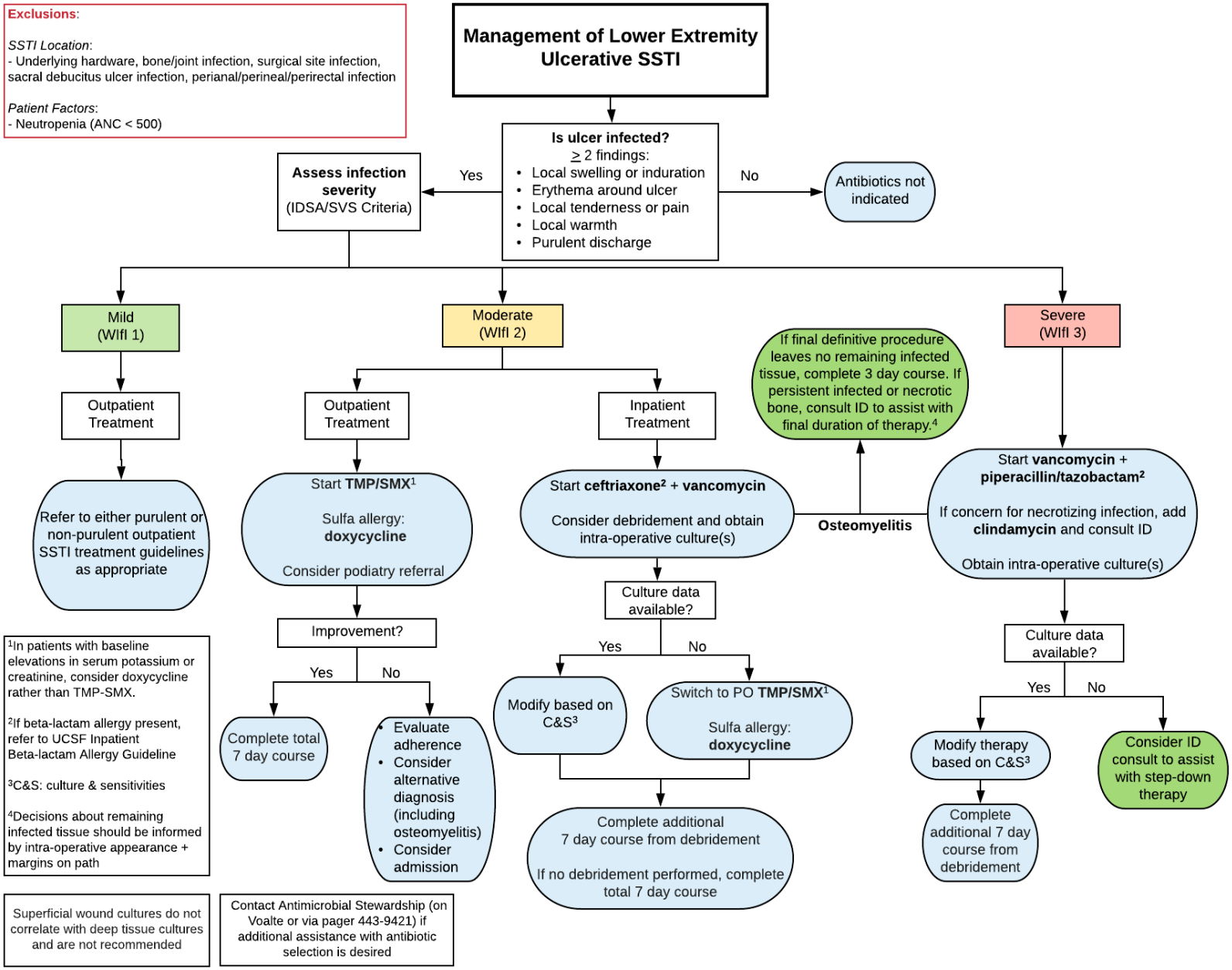
Table I: IDSA/SVS WIfI Wound Severity Classification

Clinical manifestation of infection	SVS WIfI	IDSA Infection Severity
No symptoms or signs of infection	0	Uninfected
Infection present, as defined by the presence of at least 2 of the following: • Local swelling or induration • Erythema >0.5 to ≤2 cm around the ulcer • Local tenderness or pain • Local warmth • Purulent discharge (thick, opaque to white, or sanguineous secretion) 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)	1	Mild
Local infection (as described above) with erythema >2 cm, or involving structures deeper than skin and subcutaneous tissues (e.g., abscess, osteomyelitis) **and** No systemic inflammatory response signs (as described below)	2	Moderate
Local infection (as described above) with signs of SIRS, as manifested by 2 or more of the following: • Temperature >38º or <36ºC • Heart rate >90 bpm • Respiratory rate >20 breaths/min or $PaCO_2$ <32 mm Hg • WBC >12,000 or <4,000 or 10% bands	3	Severe


Exclusions:
SSTI Location:
- Underlying hardware, bone/joint infection, surgical site infection, orbital/periorbital cellulitis, perianal/perineal/perirectal infection
Injury Context:
- Bite-associated infection, infection associated with immersion or penetrating trauma
Patient Factors:
- Neutropenia (ANC < 500)
Separate oral antibiotic coverage for MRSA and Strep spp is not recommended for purulent SSTI
Management of Purulent SSTI (abscess/pustule)
*For ulcerative SSTI, refer to separate Ulcerative SSTI guideline
Concern for necrotizing infection?
STOP! Call appropriate surgical service and consult ID
Start IV vancomycin + Piperacillin-tazobactam (UCSF/SFVA) OR ertapenem (ZSFG) + Clindamycin
Outpatient Treatment
CDU Treatment
*Refer to CDU guideline for triage decisions
Inpatient Treatment
Drainable abscess?
Yes
No
Perform I&D
Start PO TMP-SMX[1]
If sulfa allergy: Clindamycin
Responding?
Complete 5 days total treatment
Ultrasound to evaluate for abscess
Consider admission
Choose alternative PO antibiotic for patients without abscess who are not admitted
Clinical trial data support the addition of TMP-SMX s/p I&D. However, most patients will be cured regardless of whether antibiotics are used. Benefits of antibiotic therapy should be weighed against the possible risks.
Perform I&D, send culture/sensitivity
Start IV vancomycin
Improvement after 24 hours?
Switch to PO TMP-SMX[1]
If sulfa allergy: Clindamycin
Duration: 5 days from start of vancomycin
*ED staff to follow-up cultures
Switch to PO TMP-SMX[1]
If sulfa allergy: Clindamycin
Duration: 5 days from start of vancomycin
Culture results available?
Yes
No
Switch to PO antibiotic based on culture
Duration: 5 days from start of vancomycin
Consider ID consultation
Switch to PO TMP-SMX or clindamycin (if TMP-SMX given prior)[1]
Duration: 5 days from start of vancomycin
[1] In patients with baseline elevations in serum potassium or creatinine, consider using clindamycin rather than TMP-SMX.


Exclusions:
SSTI Location:
- Underlying hardware, bone/joint infection, surgical site infection, orbital/periorbital cellulitis, perianal/perineal/perirectal infection
Injury Context:
- Bite-associated infection, infection associated with immersion or penetrating trauma
Patient Factors:
- Neutropenia (ANC < 500)
Bilateral cellulitis is rare
For non-necrotizing cellulitis, imaging is only necessary in the case of poor response to antibiotic therapy
In the absence of systemic signs of infection, routine blood cultures are not recommended
Separate oral antibiotic coverage for MRSA and Strep spp is not recommended for non-purulent SSTI
Management of Non-Purulent SSTI (cellulitis/erysipelas)
*For ulcerative SSTI, refer to separate Ulcerative SSTI guideline
Concern for necrotizing infection?
STOP! Call appropriate surgical service and consult ID
Start IV vancomycin
+
Piperacillin-tazobactam (UCSF/SFVA) OR ertapenem (ZSFG)
+
Clindamycin
Outpatient Treatment[1]
PO cephalexin
If beta-lactam allergy (BLA): Clindamycin
Responding?[2]
Yes
No
Continue to complete 5 days
Image for abscess
Abscess present?
Yes
No
Refer to Purulent SSTI guideline
Evaluate adherence
Adjunctive therapies (see below)
Consider alternative diagnosis
Consider admission
CDU Treatment[1]
*Refer to CDU guideline for triage decisions
IV cefazolin[3]
Improvement within 24 hours?
Yes
No
Switch to PO cephalexin
Duration: 5 days from start of cefazolin
Inpatient Treatment[1]
IV cefazolin[3]
Responding?[2]
Yes
No
Switch to PO cephalexin
Duration: 5 days from start of cefazolin
Switch to IV vancomycin
Image for abscess
Adjuctive therapies (see below left)
Consider alternative diagnosis
Responding?[2]
No
Yes
ID/Derm consultation
Switch to PO TMP-SMX[4]
If sulfa allergy: Clindamycin
Duration: 5 days from start of vancomycin
[1] MRSA is rarely implicated in non-purulent cellulitis. Cases for which MRSA coverage might be considered include cellulitis associated with penetrating trauma, injection drug use, and MRSA nasal colonization.
[2] Response to antibiotic therapy may not be immediate, and erythema may progress in the first 24-48 hours. Failure to improve within the first 72 hours is not necessarily indicative of clinical failure.
[3] If beta-lactam allergy present, refer to UCSF Inpatient Beta-lactam Allergy Guideline
[4] In patients with baseline elevations in serum potassium or creatinine, consider using clindamycin rather than TMP-SMX.
Adjunctive Therapys for Non-Purulent SSTI:
- Leg elevation
- Treatment of tinea pedis
- Adequate foot care/toenail clipping


Management of Recurrent SSTI
(3 or more episodes/year)
Recurrent
Non-purulent SSTI
Do NOT use these guidelines while patient is actively infected
Recurrent
Purulent SSTI
Elevate affected area(s)
Manage predisposing factors:
- Tinea pedis
- Edema, lymphedema
- Cutaneous disorders (i.e., eczema)
- Venous insufficiency
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.
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
Laundering/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
Non-pharmacologic interventions (see bottom left)
Wash all personal items (sheets, towels, clothes)
Ongoing recurrences?
Intranasal 2% mupirocin BID
PLUS
Daily 4% chlorohexidine 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% chlorohexidine 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


Exclusions:
SSTI Location:
- Underlying hardware, bone/joint infection, surgical site infection, sacral debucitus ulcer infection, perianal/perineal/perirectal infection
Patient Factors:
- Neutropenia (ANC < 500)
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
Yes
No
Antibiotics not indicated
Assess infection severity (IDSA/SVS Criteria)
Mild (WIfI 1)
Moderate (WIfI 2)
Severe (WIfI 3)
Outpatient Treatment
Refer to either purulent or non-purulent outpatient SSTI treatment guidelines as appropriate
Outpatient Treatment
Start TMP/SMX1
Sulfa allergy: doxycycline
Consider podiatry referral
Improvement?
Yes
No
Complete total 7 day course
• Evaluate adherence
• Consider alternative diagnosis (including osteomyelitis)
• Consider admission
Inpatient Treatment
Start ceftriaxone2 + vancomycin
Consider debridement and obtain intra-operative culture(s)
Culture data available?
Yes
No
Modify based on C&S3
Switch to PO TMP/SMX1
Sulfa allergy: doxycycline
Complete additional 7 day course from debridement
If no debridement performed, complete total 7 day course
Osteomyelitis
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
Start vancomycin + piperacillin/tazobactam2
If concern for necrotizing infection, add clindamycin and consult ID
Obtain intra-operative culture(s)
Culture data available?
Yes
No
Modify therapy based on C&S3
Complete additional 7 day course from debridement
Consider ID consult to assist with step-down therapy
1In patients with baseline elevations in serum potassium or creatinine, consider doxycycline rather than TMP-SMX.
2If beta-lactam allergy present, refer to UCSF Inpatient Beta-lactam Allergy Guideline
3C&S: culture & sensitivities
4Decisions about remaining infected tissue should be informed by intra-operative appearance + margins on path
Superficial wound cultures do not correlate with deep tissue cultures and are not recommended
Contact Antimicrobial Stewardship (on Voalte or via pager 443-9421) if additional assistance with antibiotic selection is desired

Appendix

SSTI Dosing, Non-dialysis			
Drug	**CrCl > 50 mL/min**	**CrCl 15-50 mL/min**	**CrCl < 15 mL/min**
Cephalexin	500mg PO TID	250mg PO TID	250mg PO daily
Clindamycin	300-450mg PO TID	300-450mg PO TID	300-450mg PO TID
Doxycycline	100mg PO BID	100 mg PO BID	100mg PO BID
TMP/SMX DS 800/160 mg	40-59kg: 1 DS tab PO BID 60-70kg: 1 DS tab PO TID >80kg: 2 DS tab PO BID	40-59kg: 1 DS tab PO daily 60-79kg: 1 DS tab PO BID >80kg: 1 DS tab PO TID	Use alternative antibiotic

SSTI Dosing in Intermittent and Continuous Hemodialysis		
Drug	**Intermittent Hemodialysis**	**Continuous Renal Replacement Therapy**
Cephalexin	500mg PO daily (post-HD on HD days)	Use dosage for CrCl>50
Clindamycin	300mg PO TID	300mg PO TID
Doxycycline	100mg PO BID	100mg PO BID
TMP/SMX DS 800/160 mg	2.5-5mg/kg/day TMP component*	5mg/kg/day TMP component*

*Use adjusted body weight