Skin and Soft Tissue Infections: Treatment Guidance

The treatment of Skin/Soft Tissue Infections (SSTIs) largely depends on the most likely causative organisms, location of infection and severity of disease. These guidelines are not intended to replace clinical judgment. Any therapeutic decisions should take into consideration patient history, comorbidities, suspected microbiologic etiology, institutional/community antimicrobial susceptibility patterns, and antibiotic cost. These guidelines are to inform *empiric* therapy, and ***if specific pathogens are known, treatment should be targeted to those pathogens.***

In certain populations (e.g. people who inject drugs, immunosuppressed, travelers), the suspected pathogens may include a broader range of organisms. Cultures should be obtained if debridement or incision and drainage (I & D) is performed and/or if there is a discrete collection of pus or drainage that would allow an appropriate culture specimen to be obtained.

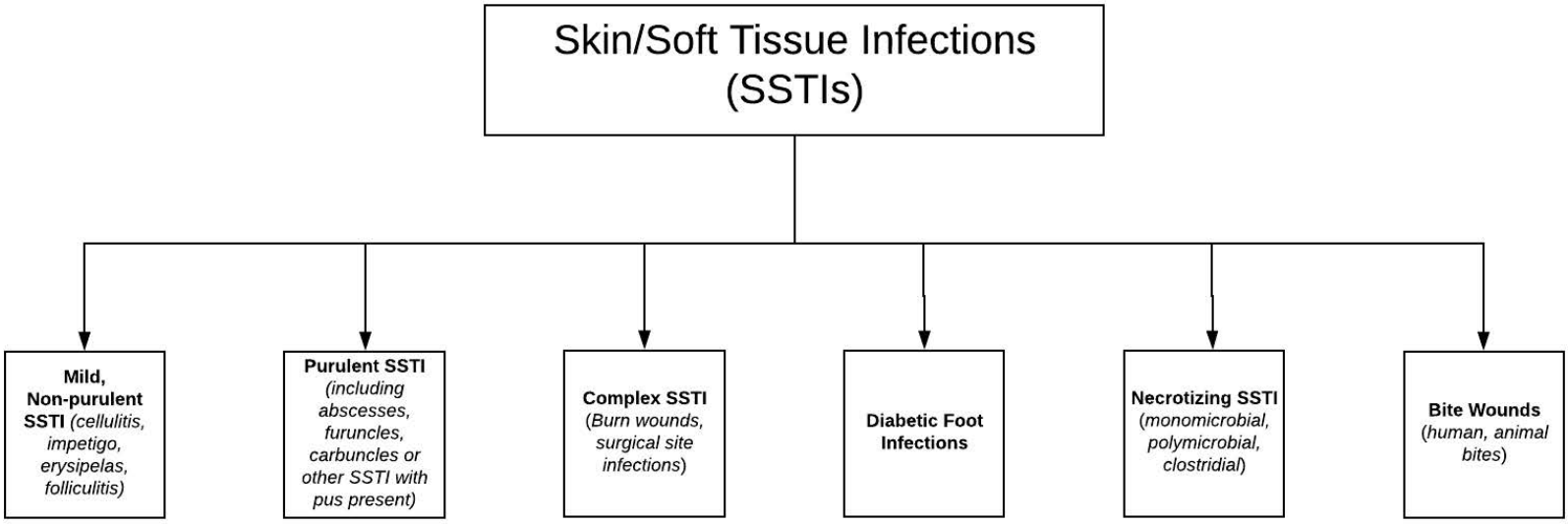
Infectious Diseases consultation is strongly recommended for patients with complex infections, those who have severe infections, and those at high risk for complications.

Durations of therapy: Durations are provided for common clinical syndromes. These durations may need to be extended in situations coupled with more complicated infections, such as bacteremia, bone/joint infection, prosthetic material infection, or endovascular infection. As above, infectious diseases consultation is strongly recommended in these situations.

Antibiotic allergy: Recommendations for patients with penicillin allergies are provided throughout this document. For further details on penicillin allergies, please refer to our penicillin allergy guidance document. For patients with non-penicillin beta-lactam allergies, please refer to a separate non-penicillin beta-lactam allergy guidance document. Consider infectious diseases consultation in patients with multiple or complex antibiotic allergies, as this document is limited in its scope to penicillin allergies.

Below is a content algorithm for the SSTI guideline. Click on the boxes to jump to the SSTI for which you need guidance. This resource is intended for educational and quality improvement purposes. Please acknowledge Nebraska Medicine Antimicrobial Stewardship Program if used.

Note: Unless otherwise specified, recommendations are based on current IDSA guidelines for management of SSTIs (Click here to access: *Stevens DL, et al. Clin Infect Dis. 2014; 59: e10-52*).



Click on the boxes above to jump to the SSTI for which you need guidance

Back to first page

Type of Infection	Suspected Organisms	Recommended Treatment
Non-purulent cellulitis (no purulent material or wound present)	Most commonly beta-hemolytic Streptococcus [*Strep pyogenes* (group A strep), *Strep agalactiae* (group B strep or GBS)], *Strep dysgalactiae* (group C strep), Group G strep, Rarely *Staphyloccus aureus* (normally MSSA)	For all patients: leg elevation **Mild (and oral transition for moderate-severe infections)** • **Preferred:** Cephalexin 1000mg PO q8h (alternative: 500mg PO q6h) **OR** Cefadroxil 1000mg q12h *Severe Penicillin Allergy*[†]: Linezolid 600mg PO q12h **OR** TMP/SMX DS 1 tab PO q12h Duration: 5-7 days **Moderate-severe** • **Preferred:** Cefazolin 2g IV q8h • Alternatives**:** Linezolid 600mg PO q12h **OR** IV Ceftriaxone 2g daily *Penicillin Allergy*[†]: Cefazolin 2g IV q8h Duration: 5-7 days **Severe systemic illness (e.g., septic shock)** • Consider Linezolid 600 mg PO/IV q12h **OR** Daptomycin 4 mg/kg IV q24h **OR** Vancomycin IV [*Consult pharmacy for patient-specific dose*] **No response/worsening at 48 hours** • In most cases, the preferred antibiotic regimens remain the best choice. If not on a preferred regimen, change to a preferred antibiotic regimen. **If on appropriate therapy:** • Consider infectious diseases consultation • Consider non-infectious etiologies (e.g., lymphedema, stasis dermatitis) • Assess for an uncontrolled source (necrotizing infection, abscess) • Consider extending duration of antibiotics if inadequate clinical response, no longer than 7-10 days total antibiotics If streptococcal infection confirmed on culture (no penicillin allergy): • PO: Amoxicillin 875mg PO q12h **OR** Cephalexin 500-1000mg PO q8h • IV: Ampicillin 2g q6h **OR** Cefazolin 2g IV q8h
Folliculitis	Typically *S. aureus* *P. aeruginosa* (hot tub)	• Warm compress • Topical antibiotics: Mupirocin q8h for 5-7 days • No systemic antibiotics needed
Impetigo (honey-crusted lesions)	*S. aureus*, including CA-MRSA, *S. pyogenes*	**Limited disease:** • Warm water soaks • Mupirocin topical ointment q8h x 5d **Extensive disease: Obtain culture** • Cephalexin 1000 mg PO q8h *(if no MRSA suspected)* **OR** • TMP/SMX DS 1 tab PO q12h* **OR** • Doxycycline 100mg PO q12h ***(if MRSA confirmed)*** Duration: 7 days

Back to first page

Erysipelas (superficial SSTI limited to dermal lymphatics with clear demarcation)	*S. pyogenes*, rarely *S. aureus*, including MRSA, or *S. agalactiae*	**Mild (and oral transition for moderate-severe infections)** • Amoxicillin 875mg PO q12h **OR** • Cephalexin 1000mg PO q8h **OR** • Cefadroxil 1000mg PO q12h *Severe Penicillin Allergy*†: Linezolid 600mg PO q12h or TMP/SMX DS 1 tab PO q12h Duration: 5-7 days **Moderate-Severe** • Ampicillin 2g IV q6h **OR** • Cefazolin 2g IV q8h *Severe Penicillin Allergy*†: Cefazolin 2g IV q8h Duration: 5-7 days If concern for MRSA, consider TMP/SMX DS 1 tab PO q12h **OR** Linezolid 600mg PO/IV q12h **OR** Daptomycin 4mg/kg IV q24h **OR** Vancomycin IV [*Consult pharmacy for patient-specific dose*] Facial erysipelas should generally be treated with initial IV therapy including MRSA coverage

TMP/SMX – trimethoprim/sulfamethoxazole; *May consider using 2 DS tabs PO bid for more severe infections. *Monitor for increased adverse effects, such as hyperkalemia and GI upset.*
¶Should not be used in pregnant women or children under the age of 8 years.
¥Ciprofloxacin 500mg PO q12h is an alternative for outpatients, but is not on inpatient formulary
† For further information on allergies, see NM ASP penicillin allergy and non-penicillin beta-lactam allergy guidance documents

Type of Infection	Suspected Organisms	Recommended Treatment
Purulent Skin/Soft Tissue Infections (including abscess, furuncles, carbuncles or other SSTI with purulence present)	***S. aureus,* including CA- MRSA and ß-hemolytic Streptococci**	➢ **Incision/Drainage is essential for clinical cure** ➢ **Adjunctive antibiotics are recommended for all abscess >2cm[1,2] or in the following clinical situations:** • Severe or extensive disease (multiple sites) • Rapid progression of soft tissue infection • Signs/symptoms of systemic illness • Immunosuppression or comorbidities (diabetes, HIV, active neoplasm) • Extremes of age • Associated septic phlebitis • Sensitive area (face, hand, genitals) • Lack of response to incision/drainage **Mild** • TMP/SMX DS 1 tab PO q12h* **OR** • Doxycycline/Minocycline¶ 100 mg PO q12h Duration: 5 days **Moderate-severe** • Linezolid 600mg PO/IV q12h **OR** Daptomycin 4mg/kg IV q24h **OR** Vancomycin IV [*Consult pharmacy for patient-specific dose*] Duration: 5-7 days **If gangrene, immunocompromised, and/or severe systemic symptoms, treat as per necrotizing SSTI guidance below**

Back to first page

<table>
<tr>
<td rowspan="2">Necrotizing Soft Tissue Infections

Necrotizing fasciitis, Fournier's gangrene, Ludwig's angina, Clostridial myonecrosis (gas gangrene)</td>
<td>Empiric Therapy
(Pathogen unknown)</td>
<td>Immediate surgical debridement and culture
• Consult emergency general surgery (EGS) immediately for surgical triage
  ○ Exception: Consult ENT for Ludwig's angina
• Infectious diseases consult recommended
• De-escalate antibiotics after 72 hrs. or when specific culture data becomes available

<u>Preferred Regimen:</u>
• Linezolid 600mg IV/PO q12h PLUS Piperacillin/tazobactam 4.5g IV q8h over 4 hours
• Linezolid 600mg IV/PO q12h PLUS Cefepime 1g IV q6h PLUS Metronidazole 500mg IV/PO q8h

Alternatives:
• Vancomycin IV [Consult pharmacy for patient-specific dose] PLUS
Clindamycin 900mg IV q8h PLUS
Cefepime 1g IV q6h OR Piperacillin/tazobactam 4.5g IV q8h over 4 hours

Severe Penicillin Allergy†: Replace Piperacillin/tazobactam with Cefepime 1g IV q6h PLUS Metronidazole 500mg PO/IV q8h

Severe Penicillin AND Cephalosporin Allergy†: Replace Cefepime with Levofloxacin 750mg¶¥ PO/IV q24h OR Aztreonam 2g IV q8h</td>
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<td>Pathogen-specific therapy</td>
<td><u>Type I</u> – mixed aerobic and anaerobic flora
• De-escalate therapy based on culture data

<u>Type II</u> – monomicrobial
• S. pyogenes: Aqueous Penicillin G 4 MU IV q4h PLUS either Linezolid 600mg PO q12h^ OR Clindamycin 900mg IV q8h^
• MSSA: Cefazolin 2g IV q8h OR Oxacillin 2g IV q4h
• MRSA: Linezolid 600 mg PO/IV q12h OR Daptomycin 4 mg/kg IV q24h OR Vancomycin IV [Consult pharmacy for patient-specific dose]

<u>Type III</u> – Clostridial (C. perfringens, rarely C. septicum)
• Aqueous Penicillin G 2-4 MU IV q4h PLUS either Linezolid 600mg PO q12h^ OR Clindamycin 900mg IV q8h^

Duration: <u><48 hours after completion of surgical debridement</u> (source control achieved) in the absence of cellulitis or bloodstream infection</td>
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CA-MRSA = community-associated methicillin-resistant *S. aureus*; TMP/SMX= trimethoprim/sulfamethoxazole
*May consider using TMP/SMX DS 2 tabs PO bid for more severe infections. Monitor for increased adverse effects, such as hyperkalemia and GI upset. ¶Should not be used in pregnant women or children under the age of 8 years.
¥Ciprofloxacin 500mg PO q12h is an alternative for outpatients
[1]Talan DA, et al. NEJM. 2016;374:823-32. [2]Daum RS, et al. NEJM. 2017;376:2545-55
^For duration of toxin-suppressive therapies (linezolid and clindamycin), recommend discontinuation after improvement in hemodynamic parameters (e.g., shock) and infection spread has ceased
† For further information on allergies, see NM ASP penicillin allergy and non-penicillin beta-lactam allergy guidance documents

Back to first page

Type of Infection	Suspected Organisms	Recommended Treatment
Bite wounds	**Human:** *S. viridans, S. aureus, Haemophilus spp., Eikenella corrodens, Peptostreptococcus, Fusobacterium, Porphyromonas, Prevotella*	- **Wound irrigation, evaluate for deep penetration** - Prophylaxis for non-infected bites wounds could be considered in the following situations: • Deep puncture • Moderate or severe with crush injury • On hand, face, or genitals • Near prosthetic material • Involves bone, joint, or poorly vascularized area • Patient is immunocompromised **Prophylaxis or Treatment of Mild Infection** • Amoxicillin/clavulanate 875/125 mg PO q12h Prophylaxis Duration: 3-5 days Mild Infection Duration: 5-7 days *Penicillin Allergy:* Levofloxacin¶,¥ 750mg PO q24h **PLUS** Metronidazole 500mg PO TID **Severe Infection:** • Ampicillin/sulbactam 3g IV q6h **OR** • Ceftriaxone 2g IV q24h **PLUS** Metronidazole 500mg IV q8h Duration: 7 days *Penicillin Allergy†*: Ceftriaxone 2g IV q24h **PLUS** Metronidazole 500mg PO/IV q8h *Severe Penicillin AND Cephalosporin Allergy†:* Levofloxacin 750mg PO/IV q24h **PLUS** Metronidazole 500mg PO/IV q8h
	Dog/cat: *Pasteurella multocida,* streptococci, staphylococci, *Fusobacterium, Bacteroides, Porphyromonas, Prevotella* Consider *Capnocytophaga canimorsus* in patients with asplenia and dog bites. Anyone without a spleen should receive prophylaxis after a bite and immediate treatment for a fever due to rapid onset of sepsis from encapsulated organisms	• **Consider tetanus booster and rabies vaccines.** • **Wound irrigation, evaluate for deep penetration** • Prophylaxis for non-infected bites wounds should be considered in the same situations described above for human bites. **Prophylaxis or Treatment of Mild Infection** • Amoxicillin/clavulanate 875/125 mg PO q12h Prophylaxis Duration: 3-5 days Mild Infection Duration: 5-7 days **Severe infection:** • Ampicillin/sulbactam 3g IV q6h **OR** • Ceftriaxone 2g IV q24h **PLUS** Metronidazole 500mg PO/IV q8h Duration: 7 days *Penicillin Allergy†*: Ceftriaxone 2g IV q24h **PLUS** Metronidazole 500mg PO/IV q8h *Severe Penicillin AND Cephalosporin Allergy†*: Levofloxacin 750mg PO/IV q24h **PLUS** Metronidazole 500mg PO/IV q8h

TMP/SMX = trimethoprim/sulfamethoxazole; *May consider using TMP/SMX DS 2 tabs PO bid for more severe infections. *Monitor for increased adverse effects, such as hyperkalemia and GI upset.*
¶Should not be used in pregnant women or children under the age of 8 years.

Back to first page

¥Ciprofloxacin 500mg PO q12h is an alternative for outpatients

† For further information on allergies, see NM ASP penicillin allergy and non-penicillin beta-lactam allergy guidance documents

Type of Infection	Suspected Organisms	Recommended Treatment
Burn Wounds	*Staph. aureus, Pseudomonas aeruginosa*	• **Surgical debridement is essential for clinical cure** • Topical antimicrobials may be beneficial, directed by Burn surgeons/Dermatology • Systematic prophylactic antibiotics are not routinely recommended outside of surgical site infection prophylaxis[π] For active infections, empiric therapy should be directed against likely organisms, or targeted therapy in cases where pathogens are identified ***Pseudomonas aeruginosa coverage*** • Cefepime 1g IV q6h **OR** • Piperacillin/tazobactam 4.5g IV q8h over 4 hours *Penicillin Allergy*[†]: Cefepime 1g IV q6h *Severe Penicillin AND Cephalosporin Allergy*[†]: Levofloxacin[¶,¥] 750mg IV q24h ***Staph. aureus coverage*** • MSSA: Cefazolin 2g IV q8h **OR** Oxacillin 2g IV q4h • MRSA: Vancomycin IV [*Consult pharmacy for patient-specific dose*]
Surgical Site Infections (SSI)	**SSI Prophylaxis**	• **Most** surgeries only require a single preoperative dose of Cefazolin 2g IV, with intraoperative re-dosing for surgeries >4h. Post-operative dosing is NOT typically necessary. • Optimal timing: Within 60 minutes before surgical incision Exceptions: Fluoroquinolones and Vancomycin (within 120 minutes before surgical incision) • Click here to view our current SSI prophylaxis guidelines on the ASP website

Back to first page

	Treatment of established surgical site infections
	
	(choice of antibiotic depends on site of surgery)
		• **Incision/drainage are essential for clinical cure**
		• Adjunctive antibiotics recommended in cases with systemic symptoms/signs, or erythema/induration extending >5cm
		
		Surgery of trunk, head/neck, extremity (*away from axillae, perineum*)
		• *MSSA:*
		  ○ PO: Cephalexin 1000mg PO q8h
		  ○ IV: Cefazolin 2g IV q8h **OR** Oxacillin 2g IV q4h
		• *MRSA:*
		  ○ PO: TMP/SMX 1 DS PO q12h* **OR** Linezolid 600mg PO q12h
		  ○ IV: Linezolid 600mg PO/IV q12h **OR** Daptomycin 4mg/kg IV q24h **OR** Vancomycin IV [*Consult pharmacy for patient-specific dose*]
		
		Surgery of GI tract/intra-abdominal, female genital tract, perineum
		• Ceftriaxone 2g IV q24h **PLUS** Metronidazole 500 mg PO/IV q8h **OR**
		• Piperacillin/tazobactam 4.5g IV q8h over 4 hours
		
		Severe Penicillin Allergy†: Ceftriaxone 2g IV q24h **PLUS** Metronidazole 500 mg PO/IV q8h
		
		Severe Penicillin AND Cephalosporin Allergy†: Levofloxacin¶,¥ 750 mg PO/IV q24h **PLUS** Metronidazole 500mg PO/IV q8h
		
		Durations:
		Superficial wound infections: 5-7 days
		Deeper surgical wound infection: Depends on extent of infection
		Intra-abdominal infections with adequate source control: 3-5 days

TMP/SMX = trimethoprim/sulfamethoxazole; *May consider using TMP/SMX DS 2 tabs PO bid for more severe infections. *Monitor for increased adverse effects, such as hyperkalemia and GI upset.*

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ᵀᵀAvni Tomer et al. Prophylactic antibiotics for burns patients: systematic review and meta-analysis *BMJ* 2010; 340 :c241

† For further information on allergies, see NM ASP penicillin allergy and non-penicillin beta-lactam allergy guidance documents

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Reviewed by: Jasmine R Marcelin, MD; Jonathan Ryder, MD; Trevor Van Schooneveld, MD; Scott Bergman, PharmD; Mark E Rupp, MD; M. Salman Ashraf, MBBS; Bryan Alexander, PharmD

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