Skin and Soft Tissue Infections: Treatment Guidance

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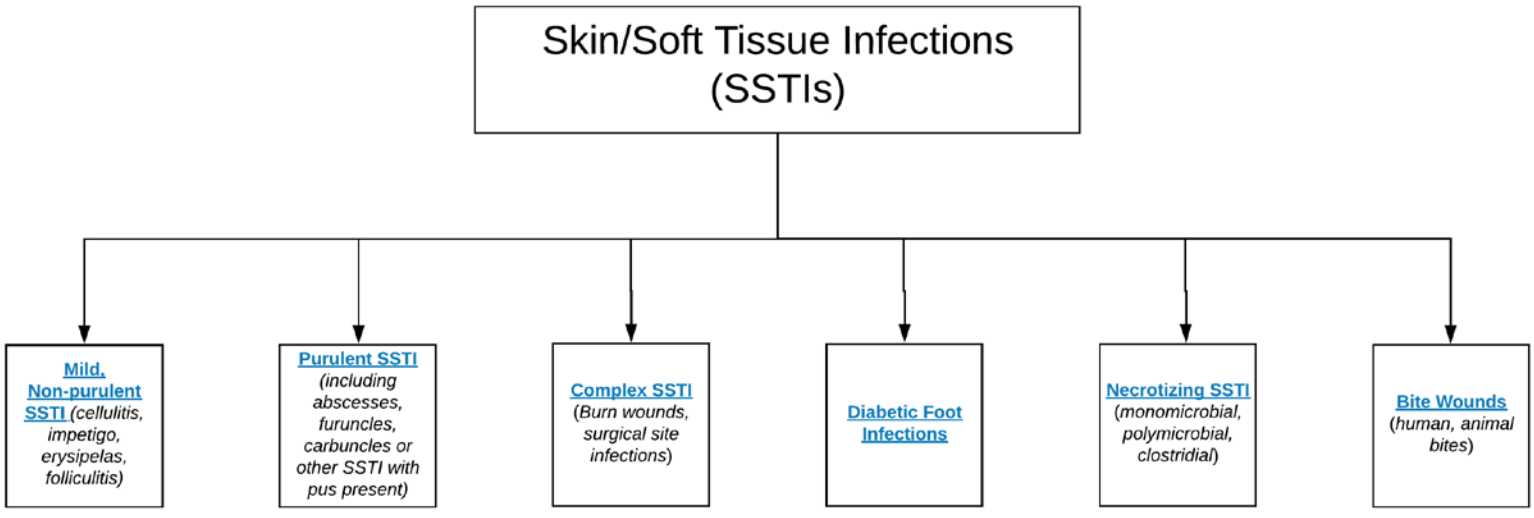
The treatment of Skin/Soft Tissue Infections (SSTIs) largely depends on the most likely causative organisms, location of infection and severity of disease. These guidelines are not intended to replace clinical judgment. Any therapeutic decisions should take into consideration patient history, comorbidities, 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. intravenous drug abusers, 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 serious complications.

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

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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)	**Mild** • Cephalexin 500mg PO q6h **OR** • Dicloxacillin 500mg PO q6h *Severe Penicillin Allergy*: Clindamycin 300 mg PO q8h **Moderate-severe** • Cefazolin 2g IV q8h **OR** • Oxacillin 2g IV q6h *Severe Penicillin Allergy*: Clindamycin 600 mg IV q8h **Severe systemic illness or no response/worsening at 48 hours** • Consider vancomycin 10-15 mg/kg IV q12h[§] If streptococcal infection confirmed on culture (no PCN allergy): • PO: Penicillin VK 500 mg PO q6h **OR** Amoxicillin 875mg PO BID • IV: Aqueous Penicillin G 2 MU q4h **OR** Ampicillin 2g q4-6h
Folliculitis	Typically *S. aureus* *P. aeruginosa* (hot tub)	- Warm compress - Topical antibiotics: Polymixin/bacitracin ointment - No systemic antibiotics needed
Impetigo (honey-crusted lesions)	*S. aureus*, including CA-MRSA, *S. pyogenes*	• Warm water soak **Limited disease:** • Mupirocin topical ointment TID x 7d **Extensive disease: Obtain culture** • Cephalexin 500 mg PO q6h *(if no MRSA suspected)* **OR** • TMP/SMX DS 1 tab PO q12h* **OR** • Clindamycin 300 mg PO q8h
Erysipelas (superficial SSTI limited to dermal lymphatics with clear demarcation)	*S. pyogenes*, rarely *S. aureus*, including CA-MRSA, or *S. agalactiae*	**Mild** Penicillin VK 500 mg PO q6h **OR** Amoxicillin 875mg PO BID **OR** Cephalexin 500 PO q6h *Severe Penicillin allergy*: Clindamycin 300mg PO q8h **Moderate-Severe** Aqueous PCN G 2 MU IV q6h **OR** Ampicillin 2g IV q6h **OR** Cefazolin 2g IV q8h *Severe Penicillin allergy*: Clindamycin 600 mg IV q8h - If concern for MRSA consider TMP/SMX DS 1tab PO q12h or vancomycin 10-15 mg/kg IV q12h[§] [*Consult pharmacy for patient-specific dosing].* Facial erysipelas should generally be treated with IV therapy including MRSA coverage

CA-MRSA – community-associated methicillin-resistant *S. aureus*; 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

[§] Alternatives to vancomycin include linezolid 600 mg PO/IV q12h OR daptomycin 4 mg/kg IV q24h.

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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 SSTI** • TMP/SMX DS 1 tab PO q12h* **OR** • Doxycycline/Minocycline¶ 100 mg PO q12h **Moderate-severe SSTI** • Vancomycin 10-15 mg/kg IV q12h§ [Consult pharmacy for patient-specific dosing]. **- If gangrene, immunocompromised and/or severe systemic symptoms treat as per necrotizing SSTI guidance below**
Necrotizing Soft Tissue Infections Necrotizing fasciitis, Fournier's gangrene, Ludwig's angina, Clostridial myonecrosis (gas gangrene)	**Empiric Therapy** (pathogen unknown)	**Immediate surgical debridement and culture** - Infectious Diseases consult Recommended - De-escalate antibiotics after 72 hrs. or when specific culture data becomes available • Vancomycin 10-15 mg/kg IV q12h§ [*Consult pharmacy for patient-specific dosing]* **PLUS** • Ceftriaxone 1g (2g if >80kg) IV q24h **OR** Cefepime 1g IV q6h **PLUS** • Metronidazole 500mg IV q8h **OR** Clindamycin 900mg IV q8h **OR** • Vancomycin **PLUS** Piperacillin/tazobactam 4.5g IV q8h *Severe Penicillin Allergy:* Replace Cefepime or Ceftriaxone with Levofloxacin¶,¥ 750mg IV q24h **OR** Aztreonam 2g IV q8h
	Pathogen-specific therapy	**Type I** – mixed aerobic and anaerobic flora - De-escalate therapy based on culture data **Type II** – monomicrobial - *S. pyogenes:* Aqueous Penicillin G 2-4 MU IV q4 **PLUS** Clindamycin 900 mg IV q8h - *S. aureus:* Antistaphyloccal penicillin/cephalosporin for MSSA or Vancomycin for MRSA§ **Type III** – Clostridial (*C. perfringens*, rarely *C. septicum)* - Aqueous Penicillin G 2-4 MU IV q4 **PLUS** Clindamycin 900 mg IV q8h

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*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
§ Alternatives to vancomycin include linezolid 600 mg PO/IV q12h OR daptomycin 4 mg/kg IV q24h.
[1]Talan DA, et al. NEJM. 2016;374:823-32. [2]Daum RS, et al. NEJM. 2017;376:2545-55

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Diabetic Foot Infections **Mild:** ≥2 of the following signs of local infection: Induration, erythema, tenderness warmth, pus **Moderate:** Mild infection + abscess, osteomyelitis, septic Arthritis, >2 cm erythema or lymphangitis, without systemic signs of inflammation **Severe:** Moderate + systemic signs of infection (fever, tachycardia, leukocytosis, hypotension, sepsis Syndrome (Click here for complete DFI guideline on the ASP Website)	**Mild**: beta-hemolytic streptococci (GAS, GBS), MSSA **Moderate**: same pathogens as mild plus enteric gram-negative rods (*E. coli*, etc.) **Severe**: same pathogens as above plus anaerobes MRSA infection rare: cover only if risk factors (*history of MRSA infection or colonization*) *Pseudomonas* infection very rare: cover only with risk factors (*significant water exposure, previous isolation of Pseudomonas*)	**First rule out deep tissue infection/osteomyelitis** **Mild** • Cephalexin 1000mg PO TID **OR** • Amoxicillin-clavulanate 875/125 mg PO q12h If there is history of MRSA colonization/infection add: • Doxycycline¶ 100 mg PO q12h **OR** • TMP/SMX DS 1 tab PO q12h *Severe Penicillin Allergy*: Clindamycin 300 mg PO q8h **Moderate - PO** • Amoxicillin-clavulanate 875/125 mg PO q12h If there is history of MRSA colonization/infection add: • Doxycycline¶ 100 mg PO q12h **OR** • TMP/SMX DS 1 tab PO q12h *Severe Penicillin Allergy*: Levofloxacin¶,¥ 750 mg PO daily **PLUS** Doxycycline¶ 100 mg PO q12h **Moderate - IV** • Ceftriaxone 2g IV daily **PLUS** Metronidazole 500mg IV q8h **OR** • Ampicillin/sulbactam 3g q6h **OR** • Ertapenem 1g daily If there is history of MRSA colonization/infection: Vancomycin 10-15 mg/kg IV q12h§ *[Consult pharmacy for patient-specific dosing].* *Severe Penicillin Allergy*: Levofloxacin¶,¥ 750 mg IV daily **PLUS** Clindamycin 900 mg IV q8h **Severe** *[Consult pharmacy for patient-specific vancomycin 15 mg/kg IV q12h dosing]*§ • Vancomycin **PLUS** Ceftriaxone 2g IV daily **PLUS** Metronidazole 500mg IV q8h (*PREFERRED*); **OR** • Vancomycin **PLUS** Ertapenem 1g daily; **OR** • Vancomycin **PLUS** Piperacillin/tazobactam 4.5g IV q8h *Severe Penicillin Allergy:* Vancomycin **PLUS** Aztreonam 2g IV q8h **PLUS** Metronidazole 500mg IV q8h **Vancomycin plus piperacillin/tazobactam combination should not be first choice; Use with caution due to increased incidence of acute kidney injury**

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
§ Alternatives to vancomycin include linezolid 600 mg PO/IV q12h OR daptomycin 4 mg/kg IV q24h.

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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 or genitals • Near prosthetic material • Involves bone, joint, or poorly vascularized area • Patient is immunocompromised **Prophylaxis for 3-5 days (or treatment of mild infection)** • Amoxicillin/clavulanate 875/125 mg PO q12h *Severe Penicillin Allergy:* Levofloxacin¶,¥ 750mg PO q24h **PLUS** Metronidazole 500mg PO TID Treatment of severe active infection: • Ampicillin/sulbactam 3 g IV q6h **OR** • Ceftriaxone 2g IV daily **PLUS** Metronidazole 500mg IV q8h *Severe Penicillin Allergy*: Levofloxacin¶,¥ 750mg IV q24h **PLUS** Metronidazole 500mg IV q8h
	Dog/cat: *Pasteurella multocida,* streptococci, staphylococci, *Fusobacterium, Bacteroides, Porphyromonas, Prevotella* Consider *Capnocytophaga canimorsus* in splenectomized dog bite patients.	- **Consider tetanus booster and rabies vaccine.** - **Wound irrigation, evaluate for deep penetration** - Prophylaxis for non-infected bites wounds should be considered in the same situations described above. **Prophylaxis for 3-5 days (or treatment of mild infection)** • Amoxicillin/clavulanate 875/125 mg PO q12h **OR** • Cefuroxime 500 mg PO q12h **PLUS** Clindamycin 300 mg PO q8h *Severe Penicillin Allergy*: Clindamycin 300 mg PO q8h **PLUS** TMP/SMX 1 DS PO q12h* **Severe infection** • Ampicillin/sulbactam 3 g IV q6h **OR** • Ceftriaxone 1g (2g if >80kg) IV q24h **PLUS** Metronidazole 500 mg IV q8h *Severe Penicillin Allergy:* Levofloxacin¶,¥ 750 mg IV q24h **PLUS** Metronidazole 500 mg 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. ¥Ciprofloxacin 500mg PO q12h is an alternative for outpatients § Alternatives to vancomycin include linezolid 600 mg PO/IV q12h OR daptomycin 4 mg/kg IV q24h.

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Burn Wounds	*S. aureus, P. aeruginosa*	• **Surgical debridement is essential for clinical cure** • Topical antimicrobials may be beneficial, directed by Burn surgeons/Dermatology • Systemic 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 ***P. aeruginosa* coverage** • Cefepime 1g IV q6h **OR** • Piperacillin/tazobactam 4.5g IV q8h, infused over 4 hours *Severe Penicillin Allergy*: Levofloxacin[¶] 750mg IV q24h ***S. aureus* coverage** • MSSA: Cefazolin 2g IV q8h **OR** Oxacillin 2g IV q4h • MRSA: Vancomycin 10-15 mg/kg IV q12h[§] [Consult pharmacy for patient-specific dosing].
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 • 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
	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:* o PO – Cephalexin 500-1000mg PO q6h o IV - Cefazolin 2g IV q8h **OR** Oxacillin 2g IV q4h • *MRSA:* o PO – TMP/SMX 1 DS PO q12h* o IV – Vancomycin 10-15 mg/kg IV q12h§ *[Consult pharmacy for patient-specific dosing].* o **Surgery of GI tract/intra-abdominal, female genital tract, perineum** • Ceftriaxone 1g (2g if >80kg) IV q24h **PLUS** Metronidazole 500 mg PO/IV q8h **OR** • Ertapenem 1g IV q24h **OR** • Piperacillin/tazobactam 4.5g IV q8h, infused over 4 hours *Severe Penicillin Allergy*: Levofloxacin[¶,¥] 750 mg 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.*

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§ Alternatives to vancomycin include linezolid 600 mg PO/IV q12h OR daptomycin 4 mg/kg IV q24h.

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