

Skin and Soft Tissue Infections (SSTI)

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Objectives

- Identify the clinical presentations of common SSTIs
- Review microbiology associated with common SSTIs
- Identify SSTIs that necessitate URGENT surgical intervention
- Recognize imaging modalities that may be useful in diagnosis of SSTIs
- Identify an antibiotic plan for treatment of purulent vs. non-purulent SSTIs with particular focus on disease severity
- Describe indications for inpatient management of SSTI

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Background



SSTIs are responsible for:

- 14 million ambulatory visits per year
- 9.89 million ED visits per year
- 900,000 admissions per year
 - \$3.7B yearly total cost
- 10% of all cases of septic shock
- Incorrect antibiotic use in 49.8% of presentations
- Third highest level of variance in treatment
 - Mood disorders and nonspecific chest pain

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Pre-test

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Which of the following is the most likely diagnosis for this acute, warm, and tender skin condition?

- A) Cellulitis
- B) Contact dermatitis
- C) Ecthyma
- D) Impetigo
- E) Stasis dermatitis

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This patient is afebrile, with a heart rate of 70, BP 120/80, and RR 15. What is the most appropriate treatment?

- A) PO cephalexin
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- C) PO trimethoprim-sulfamethoxazole
- D) IV cefazolin
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Medical history is unremarkable, and he takes no medications.

On physical examination, vital signs are normal. Skin findings are shown.


The remainder of the examination is normal. Laboratory values, including leukocyte count, are within normal range.

Which of the following is the most appropriate treatment?

- A) Antibiotic therapy based on culture result
- B) Incision and drainage
- C) Incision and drainage plus oral cephalexin
- D) Oral trimethoprim-sulfamethoxazole



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A 23-year-old man is evaluated for a furuncle on the neck that appeared 1 day ago. Medical history is notable only for anaphylaxis with administration of trimethoprim-sulfamethoxazole. He is otherwise well and takes no medications.

On physical examination, temperature is 38.3 °C (100.9 °F), blood pressure is 124/75 mm Hg, pulse rate is 95/min, and respiration rate is 15/min.

After incision and drainage of the abscess, a culture is obtained.

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- A) Oral cephalexin
- B) Oral clindamycin
- C) Oral doxycycline
- D) Oral penicillin
- E) Clinical follow-up

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Following 3 days of appropriate treatment, the man from the previous question re-presents with ongoing discomfort. Exam pertinent for the same vitals as previous: Temperature is 38.3 °C (100.9 °F), blood pressure is 124/75 mm Hg, pulse rate is 95/min, and respiration rate is 15/min.

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A 57-year-old man cut his calf while working under his car in his garage. The next day he presents to the emergency department for redness which started at the calf and has rapidly spread to the ankle, thigh, and buttocks. Crepitus is noted on physical exam.

Which of the following imaging modalities would be the most appropriate for assisting in this patient's evaluation?

- A) Computed tomography (CT)
- B) Magnetic resonance imaging (MRI)
- C) X-ray
- D) All the above

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The man from the previous question undergoes imaging.

Which of the following is the proper treatment plan based on this patient's presentation and radiograph findings?

- A) IV vancomycin
- B) IV cefepime
- C) IV clindamycin
- D) Urgent surgical consultation
- E) All the above

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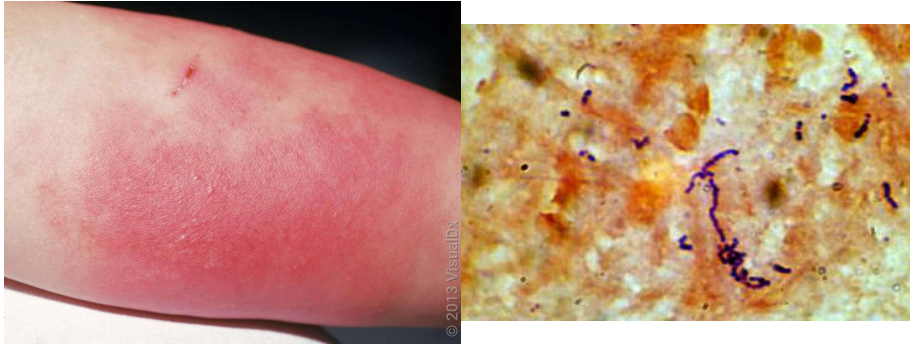
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Erysipelas



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Erysipelas



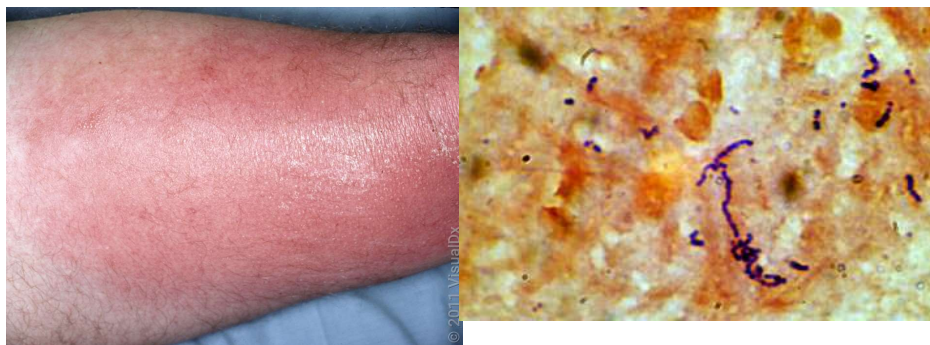
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Cellulitis



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Cellulitis



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Impetigo



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Abscess (including furuncle and carbuncle)



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Abscess



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Necrotizing SSTI



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Types of necrotizing fasciitis

Type I

- polymicrobial

Type II

- Monomicrobial (*GAS*, *Staph aureus*, *Aeromonas*, *Vibrio*)

Type III

- Clostridial myonecrosis

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Specific necrotizing syndromes



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Call the surgeons NOW

Concern for necrotizing fasciitis
Concern for Fournier's gangrene
Concern for Ludwig's angina

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When and how to image

Concern for necrotizing infection

- XR (left), CT (middle), or MRI (right).

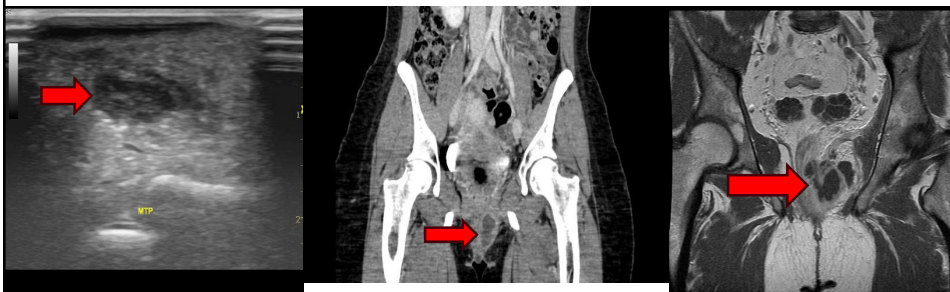


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When and how to image

Concern for large abscess

- Ultrasound (left), CT (middle), or MRI (right)



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Purulence or no purulence?



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Severity of infection



Mild

- No systemic signs of infection.

Moderate

- Some systemic signs of infection (fever, leukocytosis, tachycardia) but are well appearing, immunocompetent, and hemodynamically stable.

Severe

- Necrotizing infection.
- Multiple systemic signs of infection.
- Hypotensive.
- Immunocompromised.
- Failed appropriate antibiotic therapy.

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Purulent infections need to be drained



Mild

- I&D only

Moderate

- I&D plus PO antibiotics

Severe

- I&D plus IV antibiotics
- If necrotizing infection, additional surgical debridement required

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Inpatient or outpatient?

Outpatient

- Infections which can be managed with oral antibiotics
 - Mild purulent and non-purulent infections
 - Many moderate purulent infections (well-appearing, can tolerate PO)

Inpatient

- Infections which require IV antibiotics
 - All severe purulent and non-purulent infections
 - Some moderate purulent infections (cannot tolerate PO, worsening clinical status, etc.)

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Which antibiotics?

Purulent infections need antibiotics targeting MRSA

- PO
 - Trimethoprim-sulfamethoxazole, doxycycline
 - clindamycin provides MRSA coverage but should not be chosen over TMP-SMX or doxycycline due to increasing MRSA resistance and high C diff risk
- IV
 - Vancomycin is first line
 - Other antibiotics such as linezolid, daptomycin, and ceftaroline should usually only be given with assistance of Infectious Disease consultation

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Which antibiotics?

Non-purulent infections need antibiotics targeting *Strep* (penicillins or cephalosporins preferred)

- PO
 - Cephalexin, dicloxacillin
- IV
 - Cefazolin, oxacillin; penicillin G or ampicillin may be used if *Streptococcus* confirmed on culture

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Which antibiotics?

Necrotizing infections

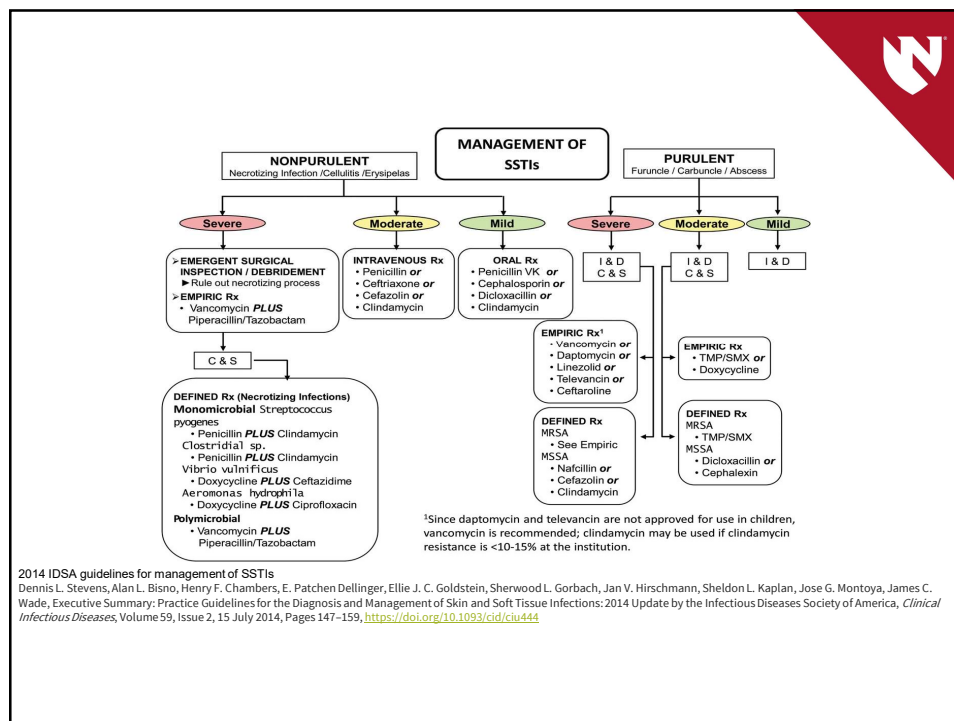
- Inpatient only
 - STAT surgical consultation
 - Infectious Disease consultation recommended
 - Empiric broad spectrum antibiotics
 - Vancomycin PLUS ceftriaxone/cefepime PLUS metronidazole/clindamycin
 - Vancomycin PLUS levofloxacin PLUS metronidazole/clindamycin for patients with severe penicillin allergy
 - Pathogen specific
 - Pending culture data

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Treatment summarized

- Mild purulent
 - I&D alone
- Mild non-purulent
 - cephalexin
- Moderate purulent
 - Trimethoprim-sulfamethoxazole or doxycycline
- Moderate and severe non-purulent
 - cefazolin
- Severe purulent
 - vancomycin
- Necrotizing infection
 - Vancomycin PLUS cefepime PLUS clindamycin

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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 [<i>Strep pyogenes</i> (group A strep), <i>Strep agalactiae</i> (group B strep or GBS)], <i>Strep dysgalactiae</i> (group C strep), Group G strep, Rarely <i>Staphylococcus aureus</i> (normally MSSA)	<p>Mild</p> <ul style="list-style-type: none"> Cephalexin 500mg PO q6h OR Dicloxacillin 500mg PO q6h <p>Severe <i>Penicillin Allergy</i>: Clindamycin 300 mg PO q8h</p> <p>Moderate-severe</p> <ul style="list-style-type: none"> Cefazolin 2g IV q8h OR Oxacillin 2g IV q6h <p>Severe <i>Penicillin Allergy</i>: Clindamycin 600 mg IV q8h</p> <p>Severe systemic illness or no response/worsening at 48 hours</p> <ul style="list-style-type: none"> Consider vancomycin 10-15 mg/kg IV q12h[†] <p>If streptococcal infection confirmed on culture (no PCN allergy):</p> <ul style="list-style-type: none"> PO: Penicillin VK 500 mg PO q6h OR Amoxicillin 875mg PO BID IV: Aqueous Penicillin G 2 MU q4h OR Ampicillin 2g q4-6h

https://www.unmc.edu/intmed/_documents/id/asp/clinicpath-ssti-guidelines-2018.pdf

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Erysipelas (superficial SSTI limited to dermal lymphatics with clear demarcation)	<i>S. pyogenes</i> , rarely <i>S. aureus</i> , including CA-MRSA, or <i>S. agalactiae</i>	<p>Mild</p> <p>Penicillin VK 500 mg PO q6h OR Amoxicillin 875mg PO BID OR Cephalexin 500 PO q6h</p> <p>Severe <i>Penicillin allergy</i>: Clindamycin 300mg PO q8h</p> <p>Moderate-Severe</p> <p>Aqueous PCN G 2 MU IV q6h OR Ampicillin 2g IV q6h OR Cefazolin 2g IV q8h</p> <p>Severe <i>Penicillin allergy</i>: Clindamycin 600 mg IV q8h</p> <p>- If concern for MRSA consider TMP/SMX DS 1tab PO q12h or vancomycin 10-15 mg/kg IV q12h[†] [<i>Consult pharmacy for patient-specific dosing</i>].</p> <p>Facial erysipelas should generally be treated with IV therapy including MRSA coverage</p>
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UNMC Antimicrobial Stewardship website



Type of Infection	Suspected Organisms	Recommended Treatment
Purulent Skin/Soft Tissue Infections (including abscess, furuncles, carbuncles or other SSTI with purulence present)	<i>S. aureus</i> , including CA-MRSA and β-hemolytic Streptococci	<ul style="list-style-type: none"> ➢ Incision/Drainage is essential for clinical cure ➢ Adjunctive antibiotics are recommended for all abscesses >2cm^{1,2} or in the following clinical situations: <ul style="list-style-type: none"> • 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 <p>Mild SSTI</p> <ul style="list-style-type: none"> • TMP/SMX DS 1 tab PO q12h* OR • Doxycycline/Minocycline† 100 mg PO q12h <p>Moderate-severe SSTI</p> <ul style="list-style-type: none"> • Vancomycin 10-15 mg/kg IV q12h‡ [Consult pharmacy for patient-specific dosing]. <p>- If gangrene, immunocompromised and/or severe systemic symptoms treat as per necrotizing SSTI guidance below</p>

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Necrotizing Soft Tissue Infections Necrotizing fasciitis, Fournier's gangrene, Ludwig's angina, Clostridial myonecrosis (gas gangrene)	Empiric Therapy (pathogen unknown)	<p>Immediate surgical debridement and culture</p> <ul style="list-style-type: none"> - Infectious Diseases consult Recommended - De-escalate antibiotics after 72 hrs, or when specific culture data becomes available <ul style="list-style-type: none"> • 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 q8h PLUS • Metronidazole 500mg IV q8h OR Clindamycin 900mg IV q8h <p>OR</p> <ul style="list-style-type: none"> • Vancomycin PLUS Piperacillin/tazobactam 4.5g IV q8h <p><i>Severe Penicillin Allergy: Replace Cefepime or Ceftriaxone with Levofloxacin* 750mg IV q24h OR Aztreonam 2g IV q8h</i></p>
	Pathogen-specific therapy	<p>Type I – mixed aerobic and anaerobic flora</p> <ul style="list-style-type: none"> - De-escalate therapy based on culture data <p>Type II – monomicrobial</p> <ul style="list-style-type: none"> - <i>S. pyogenes</i>: Aqueous Penicillin G 2-4 MU IV q4 PLUS Clindamycin 900 mg IV q8h - <i>S. aureus</i>: Antistaphylococcal penicillin/cephalosporin for MSSA or Vancomycin for MRSA‡ <p>Type III – Clostridial (<i>C. perfringens</i>, rarely <i>C. septicum</i>)</p> <ul style="list-style-type: none"> - Aqueous Penicillin G 2-4 MU IV q4 PLUS Clindamycin 900 mg IV q8h

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Post test

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Which of the following is the most likely diagnosis for this acute, warm, and tender skin condition?

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The remainder of the examination is normal. Laboratory values, including leukocyte count, are within normal range.

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- Incision and drainage
- Incision and drainage plus oral cephalexin
- Oral trimethoprim-sulfamethoxazole

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After incision and drainage of the abscess, a culture is obtained.

Which of the following is the most appropriate additional treatment?

- Oral cephalexin
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References

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