Management of Skin and Soft Tissue Infections (SSTIs) in *Adults*

Including non-purulent (cellulitis) and purulent (abscess) SSTIs

ASSESSMENT

The diagnosis of cellulitis and purulent SSTI is largely clinical.

Factors to Consider

All patients should be evaluated for predisposing causes, including the presence of tinea pedis, eczema or other dermatoses, lymphedema, venous stasis disease, pressure ulcers, foreign bodies, peripheral arterial disease, and abrasions or wounds.

In at-risk populations, assessment or screening for diabetes and peripheral vascular disease is also appropriate.

Patients with lower extremity cellulitis should all be assessed for venous stasis disease. Venous stasis increases the risk of recurrent cellulitis; however, this risk is mitigated by regular compression garment use, where appropriate.

Exclusions

This guideline excludes certain forms of complicated SSTI. **Not discussed here** are patients with the following conditions, which could be associated with a broader range of pathogens.

- Severe immunodeficiency ***E.g.***
- Diabetic foot infections
- Severe peripheral arterial disease
- Bite wounds
- Head and neck infections
- Infected wounds involving injection-drug use, intra-abdominal or groin sites
- SSTI associated with exposure to, or gross contamination with, soil, fresh/salt water, or fish/seafood processing

**** E.g.*** *neutropenia, asplenia, receiving immune-suppressive medications (active chemotherapy or high-dose corticosteroids), or organ transplant recipients*

Differential Diagnosis

Misdiagnosis of SSTI is common. Clinicians should be alert to common 'mimickers', including:

- Venous stasis dermatitis
- Insect bites
- Contact dermatitis ****E.g.***
- Peripheral arterial disease
- Deep vein thrombosis
- Necrotizing fasciitis
- Septic arthritis
- Gout or pseudogout
- Hematomas
- Cutaneous herpes simplex virus or shingles

****E.g.*** *from poison ivy or the bacitracin component of topical antibiotic ointment*

If erythema fails to improve after an appropriate course of antimicrobial therapy, ***non-infectious causes*** should be strongly considered.

Initial assessment of SSTIs to determine most appropriate empiric therapy is based on:

1. Presence or absence of purulent collections (abscesses, furuncles, and wound infections).
2. Presence or absence of systemic toxicity (fever, leukocytosis) and sepsis.

'SEPSIS' - defined as the presence of organ dysfunction, including elevated lactate levels, caused by acute infection.[1]

MANAGEMENT

All Patients - Adjunct therapy

Elevation of the affected limb is an appropriate adjunctive therapy.

Affected ***upper*** extremities should be elevated higher than the shoulder.

Affected ***lower*** extremities should be elevated higher than the hip joint.

Topical antibiotics can be effective in more superficial skin infections (e.g. impetigo, folliculitis, or paronychia) but ***should not be used*** for the management of cellulitis, erysipelas or purulent SSTI.[2] They are not effective and may put patients at risk of developing contact dermatitis.

Non-Purulent SSTI (cellulitis or erysipelas)

Typical Pathogens: *Streptococcus pyogenes* or other beta-hemolytic Streptococci

Less Common: *Staphylococcus aureus*

Thinking about MRSA?

MRSA is most often associated with *purulent* skin and soft tissue infections. For mild to moderate non-purulent cellulitis, **empiric coverage is not usually required**, even in the presence of MRSA risk factors.[2, 3, 4]

Microbiologic investigations for uncomplicated, non-purulent SSTI, such as superficial wound cultures, are **not recommended**, except for blood cultures when severe infection (i.e., necrotizing infection or sepsis) is present.

MILD Non-purulent SSTI

'MILD' **=** *No signs of systemic toxicity (e.g. fever, leukocytosis) or sepsis*

1st Line Therapy
Cephalexin
500 – 1000 mg† PO q6h*

2nd Line Therapy
Amoxicillin
500 mg PO q8h*

β-Lactam Allergy+
Clindamycin
300 q6h – 450 mg PO q8h

†Consider using 1000 mg for patients with body mass index >30.
*Dose adjustment required for impaired renal function

Duration of Therapy
= 5 days, in most cases

SCAN ME

MODERATE Non-purulent SSTI

'MODERATE' **=** *Signs of systemic toxicity (e.g. fever, leukocytosis) but NOT sepsis, OR worsening despite appropriate oral therapy*

(See 'treatment failure' section, below)

1st Line Oral Therapy
Cephalexin
500 – 1000 mg† PO q6h*

β-Lactam Allergy (Oral)+
Clindamycin 300 q6h - 450 mg PO q8h

1st Line Intravenous Therapy
Cefazolin 2000 mg IV q8h* (for inpatients)
OR as an alternative for outpatient IV management *only:*
Ceftriaxone 2g IV q24h

β-Lactam Allergy (IV)+
for patients failing or unable to take oral therapy
Vancomycin 25 mg/kg IV x 1 dose, then 15 mg/kg IV q12h*
OR
Daptomycin 6-8 mg/kg IV q24h*

†Consider using 1000 mg for patients with body mass index >30.
*Dose adjustment required for impaired renal function

Duration of Therapy
= 5-7 days, in most cases[5]

Extension up to 10 days for delayed response to therapy >72 hours

+β-Lactam Allergy?

Always consider **PEN-FAST**, the penicillin allergy decision rule, to help assess a patient with any penicillin or β-lactam allergies. **Scan the QR code or visit MD+Calc** online.[6, 7]

Assessing clinical response & treatment failure in cellulitis

Marking the outline of the erythema and daily photographs will assist in the assessment. Where possible, ask the patient to take daily photos of their cellulitis to assist with this assessment.

THE FIRST 48 HOURS

Assessment of clinical response in the first 48 hours should be limited to improvements in pain, fever, and the patient's overall condition.

A mild progression of erythema is expected and acceptable during the first 48 hours, if the patient's overall condition is otherwise not worsening, or is improving.

PAIN **FEVER** **CONDITION**

As cellulitis continues to evolve, skin can begin to weep, blister, flake, or crack--none of which are necessarily indications of worsening infection.

Residual skin inflammation is a common finding, even after completion of effective therapy.[8]

Clues that **the infection is improving** include improvements in:

- Pain
- Fever
- Swelling
- Brightness or intensity of erythema

Purulent SSTI (boils, abscesses or furuncles)

Typical Pathogens:
Staphylococcus aureus (MSSA or MRSA).

Complex wound infections—such as abdominal/ groin wound or diabetic foot wound infections—often have more extensive causative pathogens and are not included here. See **Exclusions** *above.*

Management Pearls

- **Incision and drainage (I&D) is the primary treatment modality.**
- Antibiotics are helpful adjuncts in many (but not all) cases.[2, 9, 10]
- Where feasible, I&D should be accompanied by a request for bacterial culture and susceptibility of infected material from the microbiology laboratory.
- **For uncertain diagnosis,** consider ultrasound (point-of-care or via Diagnostic Imaging) or large bore (16-18g) needle aspirate to help clarify.

MILD Purulent SSTI

'MILD' **=** *Induration and erythema surrounding a single abscess, limited to less than 5 cm in size*
AND
no signs of systemic toxicity (e.g. fever, leukocytosis) or sepsis.

1st Line Therapy
Incision and drainage **ALONE** ...

UNLESS recurrence or treatment failure.

Recurrence & Treatment Failure

For cases of recurrence or treatment failure **within 30 days**, adjunctive antimicrobial therapy is recommended **as per management of Moderate Purulent SSTI.**

Doxycycline and TMP-SMX are excellent anti-staphylococcal agents, including for MRSA!

MODERATE Purulent SSTI

'MODERATE' **=** *Induration and erythema >5 cm in diameter,*
OR
signs of systemic toxicity (e.g. fever, leukocytosis) ***BUT*** *no sepsis.*

1st Line Therapy
Incision and drainage

AND...

Doxycycline 100 mg PO q12h
OR
Trimethoprim-Sulfamethoxazole (TMP-SMX)
1 double-strength tablet PO q12h*****

2nd Line Therapy

For patients failing or unable to take oral therapy:
Vancomycin
25 mg/kg IV x 1 dose,
then 15 mg/kg IV q12h*****
OR
Daptomycin 6-8 mg/kg IV q24h*****

*****Dose adjustment required for impaired renal function

Duration of Therapy = 7 days

Severe SSTI

Typical Pathogens:

Streptococcus pyogenes and *Staphylococcus aureus* (MSSA or MRSA). In cases of necrotizing soft tissue infection, gram-negative and polymicrobial infections may also be seen.

In Severe Cases...

'SEVERE' = Evidence of sepsis, or significant clinical concern for severe necrotizing soft tissue infection.

Rapid assessment for the possibility of necrotizing infection is required (See 'Red Flags' below).

These recommendations are ***empiric***. If blood, tissue or wound culture reveals a pathogenic micro-organism, ***targeted therapy *E.g.*** can be selected.

*** E.g. Targeted Therapy** - For necrotizing fasciitis due to proven Group A *Streptococcus*, transition to narrower therapy is advised, such as with penicillin G in place of Piperacillin-tazobactam plus Vancomycin.

Blood cultures, as well as cultures of infected tissues, are indicated.

IF...

If evidence of sepsis, but necrotizing soft tissue infection is NOT suspected:

Cefazolin 2g IV q8h *** +**

AND

Vancomycin
25 mg/kg IV x 1 dose, then 15 mg/kg IV q12h*****

In immunocompetent patients without diabetes or major predisposing conditions (See Exclusions above), broader coverage is generally unnecessary as these cases are largely driven by gram-positive organisms: *S. aureus* and beta-hemolytic Streptococci.

*****Dose adjustment required for impaired renal function.

Duration of Therapy = 7-10 days in most cases

IF...

If necrotizing soft tissue infection IS suspected:

Piperacillin-tazobactam 4.5 mg IV q6h*****
OR
meropenem 500 mg IV q6hr
if β-Lactam Allergy ***+**

AND

Vancomycin 25 mg/kg IV x 1 dose,
then 15 mg/kg IV q12h*****

AND

Clindamycin 900 mg IV q8h x 2-3 days

*****Dose adjustment required for impaired renal function.

Duration of Therapy = 7-10 days in most cases

Requires consultation with specialists, including surgery & infectious diseases

+ β-Lactam Allergy?

Always consider **PEN-FAST**, the penicillin allergy decision rule, to help assess a patient with any penicillin or β-lactam allergies. **Scan the QR code above, or visit MD+Calc** online.

Necrotizing fasciitis - a diagnosis not to miss

Necrotizing fasciitis is a clinical diagnosis. While it is uncommon, it is *not* rare.

Red flags for necrotizing fasciitis:

Stay alert for the following features that should trigger a concern for necrotizing fasciitis.

Pain out of proportion to visible skin findings, including pain outside of the area of erythema

Concerning skin findings, such as bullae, progressive necrosis, crepitus, or anesthesia

Rapid progression despite initial therapy – e.g. symptoms progressing markedly over a single shift, or several hours

Disproportionate systemic toxicity without another explanation, for what looks like a routine cellulitis

When in doubt, an urgent surgical consultation is indicated.

Don't wait for imaging to institute urgent therapy – early surgical involvement saves lives.

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