**Pediatric Skin and Soft Tissue Infection Pathway, Age 2 months to 17 years**

**EXCLUSION CRITERIA:** Burns • Immunocompromised • Facial or perineal • Bite • Foreign body • Surgical/indwelling device site • Hospital-acquired • Septic/toxic • Suspected necrotizing fasciitis/pyomyositis • Pressure ulcer

- **Complete History and Physical Exam** (review old culture results)
- **Purulent Cellulitis/Abscess?**
  - **Incision and Drainage**
  - **Warm compresses for small abscesses**
- **Meeting Admission Criteria?**

**Inpatient:**
- Cefazolin 33 mg/kg/dose IV q8h (max: 2000 mg/dose)

**Outpatient:**
- Cephalexin 15 mg/kg/dose PO q8h (max: 500 mg/dose)

**Alternative** (Tx failure > 48 hrs, Hx MRSA, or Cephalosporin allergy):
- Clindamycin 13mg/kg/dose PO/IV q8h (max: 600 mg/dose)

**1. Admission Criteria**
- Toxic, ill-appearing
- Age < 6 months
- Extensive involvement, rapid progression
- Inadequate drainage of large abscess
- Location requires subspecialty consult
- Unable to tolerate PO, poor pain control
- Failed outpatient 48hrs of appropriate Abx

**Duration of Therapy**
- Simple Cellulitis, Drained Abscess: **5 days**
- Complicated, Undrained Abscess: **7 days**

- Laboratory Evaluation: Routine laboratory studies are NOT recommended in healthy children with uncomplicated cellulitis or abscess.
- If no improvement in 48 hours: CBC with differential, CRP, blood culture


Approved 8/26/2021 by Dr. Carlson, SIU Department of Pediatrics, and Pediatric Emergency Medicine, Exp 8/26/2022.
SIU Clinical Guidance for Management of Skin and Soft Tissue Infections in Children

PURPOSE

This pathway should be used to guide the care of healthy children ≥ 2 months of age with suspected skin and soft tissue infections (SSTI).

GOALS

- To standardize first line antibiotics for uncomplicated SSTI
- To reduce length of antibiotic therapy for uncomplicated SSTI

INCLUSION CRITERIA

- Children ≥ 2 months of age with suspected skin and soft tissue infection

EXCLUSION CRITERIA

- Infants less than 2 months of age
- Immunodeficiency
- Surgical site infection
- Facial infection including orbital, periorbital, and dental
- Infection associated with indwelling device
- Hospital-acquired SSTI
- Pressure ulcer
- Suspected necrotizing fasciitis or pyomyositis
- Suspected sepsis, toxic or critically ill
- Animal or human bite
- Burns
- Foreign body suspected
- Perineal abscess

DEFINITIONS/MICROBIOLOGY

Cellulitis

- An infection of the skin and underlying soft tissue characterized by pain, erythema, edema and warmth
- Erysipelas is an infection of the dermis and upper subcutaneous tissues
- Cellulitis is an infection involving the subcutaneous tissues
- Organisms
  - Beta-hemolytic streptococci (Group A Streptococcus or Streptococcus pyogenes)
  - Staphylococcus aureus

Abscess

- Large (≥ 1 cm in diameter) spherical collection of pus, usually walled off by a capsule
- Abscesses involve the epidermis, dermis, and deeper skin tissue
- Furuncle (or boil) is a small abscess of a deep hair follicle
- Carbuncle is a larger/deeper abscess formed by coalescence of multiple furuncle
- Organisms:
  - *S. aureus*: methicillin resistance is 38% in pediatrics in 2019-2020
  - Streptococcus species
  - Coagulase negative *Staphylococcus*
  - Gram negative and anaerobic organisms (< 10%)

**Distinguishing Cellulitis from Abscess:**

The term cellulitis should not be used to describe cutaneous inflammation associated with underlying collections of pus, which characterizes an abscess. Subcutaneous abscesses frequently have a central papule or pustule that is surrounded by an erythematous swelling. This distinction is important because the treatment for cellulitis is antibiotics, and the treatment for abscess is incision and drainage. Most abscesses do not have overlying cellulitis; however, if an abscess has marked erythema that extends beyond the area of induration, the diagnosis of cellulitis is appropriate.

**Concern for Underlying Abscess**

- Significant induration ≥ 3 cm
- Lesion present > 2-3 days
- History of previous drainage
- Often has non-uniform induration

**Definite Abscess**

- Fluctuant tender red nodule, can be associated with swelling, warmth
- Often have pustule surrounded by a rim of erythematous swelling (not to be confused with cellulitis)

**CLASSIFICATION**

**Abscess**

- **Simple:**
  - Diameter up to 5 cm (≤ 3 cm in patients 6-11 months, ≤ 4 cm in patient 1-8 years of age)
  - No systemic symptoms
- **Complicated:**
  - Abscesses more than 5 cm in diameter (and proportionally smaller in younger children)
  - Patients with ≥ 2 sites of skin infection
  - Patients with recurrent abscess
  - Systemic symptoms

**Other classification**

- Drained
- Undrained

**Cellulitis**

- **Moderate/severe:**
  - Rapidly spreading redness (from history)
- Significant swelling/redness/pain
- Systemic symptoms/signs (fever and lethargy)
- Failed oral antibiotic therapy (24-48 hours)

- **Simple**: all other patients

**Other classification**

- **Complicated**
  - Cellulitis associated with abscess requiring surgical drainage
  - Lymphadenitis
  - Bite or penetrating injury
  - Foreign body
  - Fracture
  - Lymphedema
  - Medical comorbidities
  - Immunosuppression

- **Uncomplicated**: all other cellulitis that don’t meet criteria for complicated

**DIAGNOSIS**

**Cultures**

- Cultures of debrided material and blood cultures (prior to addition of antibiotic therapy) are warranted in the following circumstances
  - Severe local infection (eg, extensive cellulitis)
  - Systemic signs of infection (eg, fever)
  - History of recurrent or multiple abscesses
  - Failure of initial antibiotic therapy
  - Extremes of age (young infants or older adults)
  - Presence of underlying comorbidities (lymphedema, malignancy, neutropenia, immunodeficiency, splenectomy, diabetes)
  - Special exposures (animal bite, water-associated injury)
  - Presence of indication for prophylaxis against infective endocarditis

- Cultures of swabs from intact skin are not helpful and should not be performed.

**Imaging**

- Radiographic examination can be useful to determine whether a skin abscess is present (via ultrasonography) and distinguishing cellulitis from osteomyelitis (via magnetic resonance imaging).

- Radiographic evaluation may be warranted in patients with underlying immunosuppression, diabetes, venous insufficiency, or lymphedema and in patients with persistent systemic symptoms after 48 hours of antibiotic therapy

- Radiographic examination cannot reliably distinguish cellulitis from necrotizing fasciitis or gas gangrene; if there is clinical suspicion for these entities, radiographic imaging should not delay surgical intervention.
Laboratory Studies
- Routine laboratory studies are NOT recommended in healthy children with uncomplicated cellulitis or abscess.
- If not improvement in 48 hours: CBC with differential, CRP, blood culture

ADMISSION CONSIDERATIONS
- Systemic symptoms
  - Concerns for SIRS
  - Toxic, very ill appearing
  - Fever alone does not necessitate admission
- Extensive involvement (consider hands, feet, face, groin, overlying joints)
- Rapid progression
- Consider if age < 6 months
- Concern for inadequate drainage of large abscess
- Abscess location that requires subspecialty consultation
- Unable to tolerate PO antibiotics
- Inadequate pain control
- Failed initial treatment w/48 hours appropriate antibiotics
- Follow-up concerns
## MEDICAL MANAGEMENT

<table>
<thead>
<tr>
<th>Condition</th>
<th>Definition</th>
<th>Organism(s)</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impetigo bullous, non-bullous</td>
<td>Erythematous papules that rapidly evolve into vesicles/pustules that rupture forming a honey colored crust; or an erythematous erosion surrounded by a collar of the roof’s remnant</td>
<td>S. aureus (often MRSA)</td>
<td>Topical : Mupirocin — BID for 5 days Oral: if multiple lesions or in outbreaks affecting several people or outbreaks of PSGN: PO Cephalexin 7 day course PCN Allergy — Clindamycin</td>
</tr>
<tr>
<td>Ecchyma</td>
<td>Superficial dermal infection, circular, erythematous ulcers with adherent crust, often with surrounding erythematous edema</td>
<td>S. aureus (often MRSA)</td>
<td>PO Cephalexin 7 day course PCN Allergy — Clindamycin</td>
</tr>
<tr>
<td>Folliculitis (Purulent)</td>
<td>Superficial infection of the hair follicle, limited to the epidermis</td>
<td>S. aureus (often MRSA)</td>
<td>- I&amp;D is the recommended treatment. - Warm compresses suffice for small abscesses. - Consider antibiotics as adjunct in patients with significant systemic symptoms (SIRS), concern for inadequate drainage following I&amp;D, multiple sites, immunodeficiency, or young age - Clindamycin IV/PO or TMP/SMX PO - Duration: 5-7 days Tailor antibiotics according to culture results</td>
</tr>
<tr>
<td>Furuncle (Purulent)</td>
<td>- Deeper infection of hair follicle - Usually caused by S. aureus - Suppuration extends through the dermis into the subcutaneous tissues, small abscess forms</td>
<td>S. aureus (often MRSA)</td>
<td></td>
</tr>
<tr>
<td>Carbuncle (Purulent)</td>
<td>- Infection of several adjacent hair follicles - Pus from multiple follicle sites - Most common on back, neck</td>
<td>S. pyogenes Other pathogens include MSSA/MRSA B. vulnificus A. hydrophila Anaerobic streptococci</td>
<td>If no significant systemic symptoms can treat with oral therapy - Outpatient: Cephalexin PO for 5-7 days - Inpatient: cefazolin IV - If failed appropriate antibiotic after 48-72 hours, or MRSA history consider changing to Clindamycin - Duration: 5-7 days PCN Allergy — Clindamycin</td>
</tr>
<tr>
<td>Cutaneous Abscess (Purulent)</td>
<td>Collection of pus in the dermis and deeper tissues, often surmounted with a pustule encircled by rim of erythematous swelling, (not to be confused with cellulitis)</td>
<td>S. pyogenes Other pathogens include MSSA/MRSA B. vulnificus A. hydrophila Anaerobic streptococci</td>
<td></td>
</tr>
<tr>
<td>Erysipelas (Non-purulent)</td>
<td>- Limited to epidermis including superficial lymphatics - Tender, intensely erythematous, sharply demarcated border</td>
<td>Streptococci (Group A most common, other groups include B, C, F, or G) Infrequently caused by S. aureus except in cases of penetrating wounds</td>
<td></td>
</tr>
<tr>
<td>Cellulitis (Non-purulent)</td>
<td>Infection involving the deep dermis and subcutaneous fat</td>
<td>S. pyogenes Other pathogens include MSSA/MRSA B. vulnificus A. hydrophila Anaerobic streptococci</td>
<td>- Immediate surgical consultation for debriding - I&amp;D consult - Vancomycin + Cefepime + Metronidazole + Clindamycin</td>
</tr>
<tr>
<td>Necrotizing Fasciitis</td>
<td>Aggressive subcutaneous infection that tracks along the superficial fascia, often extending from the skin lesion producing “wooden-hard induration” of the subcutaneous tissue</td>
<td>S. pyogenes Other pathogens include MSSA/MRSA B. vulnificus A. hydrophila Anaerobic streptococci</td>
<td></td>
</tr>
</tbody>
</table>

Adapted from CHOP Clinical Pathway 2020
# ANTIBIOTIC RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Treatment Setting</th>
<th>Non-purulent Cellulitis</th>
<th>Purulent Cellulitis/Abscess</th>
<th>Duration of Tx/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED/Outpatient</td>
<td>Pathogen: <em>S. pyogenes</em> (most likely)</td>
<td>Pathogen: <em>S. aureus</em> (most likely)</td>
<td>Simple or uncomplicated Cellulitis: 5-7 days</td>
</tr>
<tr>
<td>Transition from IV</td>
<td>First-line Therapy: Cephalexin 15 mg/kg/dose PO q8h (max: 500 mg/dose)</td>
<td>First-line Therapy: Clindamycin 13 mg/kg/dose PO q8h (max: 600 mg/dose)</td>
<td>Abscess: 5-7 days</td>
</tr>
<tr>
<td></td>
<td>Treatment failure &gt; 48 hrs or prior history of MRSA: Clindamycin 13 mg/kg/dose PO q8h (max: 600 mg/dose)</td>
<td>OR</td>
<td>- Simple/Drained: 5 days</td>
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<tr>
<td></td>
<td>Cephalosporin allergy: Clindamycin 13 mg/kg/dose PO q8h (max: 600 mg/dose)</td>
<td>ALLERGY: Doxycycline 2 mg/kg/dose PO q12h dose (max: 100 mg/dose)</td>
<td>- Complicated/Undrained: 7 days</td>
</tr>
<tr>
<td></td>
<td>[ALLERGY: Clindamycin 13 mg/kg/dose IV q8h (max: 600 mg/dose)]</td>
<td></td>
<td>If previous culture information for patient available, tailor antibiotics to past sensitivity</td>
</tr>
<tr>
<td>Inpatient</td>
<td>First-line Therapy: Cefazolin 33 mg/kg/dose IV q8h (max: 2000 mg/dose)</td>
<td>First-line Therapy: Clindamycin 13 mg/kg/dose IV/PO q8h (max: 600 mg/dose)</td>
<td>PCP follow-up in 1-2 days after discharge</td>
</tr>
<tr>
<td></td>
<td>ALLERGY: Clindamycin 13 mg/kg/dose IV/PO q8h (max: 600 mg/dose)</td>
<td>IF TOXIC: Vancomycin (see dosing guide)</td>
<td></td>
</tr>
</tbody>
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Pathogen Susceptibility at St Johns Children’s Hospital - 2019/2020

<table>
<thead>
<tr>
<th></th>
<th>MSSA</th>
<th>MRSA</th>
<th><em>Streptococcus pyogenes</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cefazolin/Cephalexin</td>
<td>100</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>86</td>
<td>83</td>
<td>100</td>
</tr>
<tr>
<td>TMP-SMX</td>
<td>98</td>
<td>97</td>
<td>-</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>97</td>
<td>98</td>
<td>-</td>
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</tbody>
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REFERENCES


