Management if Necrotizing Soft Tissue Infection (NSTI) suspected

Urgently consult the General Surgery team. Page the surgery fellow.

Inclusion Criteria
- Suspected skin/soft tissue infection in children >44 weeks CGA

Exclusion Criteria
- Hospital-acquired, surgical site & device-associated infections
- Presumed necrotizing fasciitis
- Orbital/periorbital cellulitis
- Immunodeficiency
- Pressure injuries

Initial Evaluation
- Outline lesion with date and time
- Make patient NPO

Determine if special situation present

Concern for:
- Deep extremity infection (e.g. septic arthritis, osteomyelitis)
  Yes → See Musculoskeletal Infections pathway
  No

Concern for:
- Peri-anal abscess (within 1 cm of anal verge)
  Yes → Consult General Surgery
  No
- Breast abscess
- Perineal abscess
- Pelvirectal cyst
- Large or complex abscess

Concern for:
- Deep neck abscess
  Yes → Consult ENT
  No
- Congenital neck cyst/sinus/duct infection

Concern for:
- Facial cellulitis of dental origin
  Yes → Consult Dental
  No

Simple Cellulitis / Abscess Phase

Determine with consultant if suitable for pathway

Off Pathway

For questions concerning this pathway, contact: CellulitisAndAbscess@seattlechildrens.org

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Last Updated: January 2020
Next Expected Review: September 2024
**Cellulitis and Abscess v3.0: ED Simple Cellulitis/Abscess**

**Inclusion Criteria**
- Suspected skin/soft tissue infection in children >44 weeks CGA
- Completed Initial Phase screening for special situation / consults

**Exclusion Criteria**
- Hospital-acquired, surgical site & device-associated infections
- Presumed necrotizing fasciitis
- Orbital/periorbital cellulitis
- Immunodeficiency
- Pressure injuries

**Simple cellulitis / abscess**
- No routine labs
- Perform bedside ultrasound if uncertain of need for drainage

**Inpatient Admit Criteria** (any one of the following)
- SIRS
- Not tolerating PO
- Treatment failure on >48 hours of appropriate antibiotics
- Rapidly progressive lesion
- Pain control / wound care needs
- Inadequate follow-up

**Clinical decision to drain abscess**
- Sedation / pain control
- Incision and drainage; consider loop drainage technique
- Wound culture

**Medical Treatment**
- Oral cephalexin
- Clindamycin if failed outpatient treatment >24-48 hours or cephalexin allergic
- Consider TMP-SMX or clindamycin if MRSA risk factors

**Discharged patients**
- Non-purulent
- Purulent

**Medical Treatment**
- Consider oral TMP-SMX or clindamycin
- Antibiotics decrease risk of recurrence and treatment failure but may cause adverse effects
- **Shared Decision Making**

**Admitted patients**
- Non-purulent
- Purulent

**Medical Treatment**
- PO cephalexin or IV cefazolin
- Clindamycin if failed outpatient treatment or cephalexin allergic
- Consider TMP-SMX or clindamycin if MRSA risk factors
- Consider vancomycin if SIRS or rapid progression

**Medical Treatment**
- PO or IV TMP-SMX or clindamycin
- Consider vancomycin if SIRS, rapid progression, suspected clindamycin resistance

**Discharge Instructions**
- 5-10 days total treatment
- PCP follow-up within 24-48 hours
- If recurrent abscesses, consider household decolonization (PE 844)
- ED Comm RN follows up all cultures

**Relevant MRSA Risk Factors**
History in the last 6 months of:
- MRSA in the patient
- MRSA in the family
- Recurrent boils, pustules, “spider bites,” etc. that required antibiotics, in patient or family

**Purulent Definition**
- Actively draining pus
- History of drainage
- Abscess present

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Last Updated: January 2020
Next Expected Review: September 2024
Management if Necrotizing Soft Tissue Infection (NSTI) suspected (ED GOC 11996)

Call RRT. Urgently consult the General Surgery fellow.

Inclusion Criteria
- Suspected skin/soft tissue infection in children >44 weeks CGA
- Completed Initial Phase screening for special situation / consults

Exclusion Criteria
- Hospital-acquired, surgical site & device-associated infections
- Presumed necrotizing fasciitis
- Orbital/periorbital cellulitis
- Immunodeficiency
- Pressure injuries

Frequent re-evaluation
- Clinical exam
- Outline lesion with date and time
- Culture data

Improving
- Tailor antibiotics if culture results are available
- Use narrowest-spectrum agent possible
- Change to PO antibiotics as soon as clinically indicated

Not Improving
- Tailor antibiotics if culture results are available
- If rapid progression at any time, consider NSTI
- If significant expansion >1-2 cm beyond margins OR no improvement on antibiotics at 48 hours, consider change in antibiotics and image (U/S preferred) to rule out abscess
- If fluctuance develops or abscess on imaging, consult general surgery
- Consult ID as necessary

Discharge Criteria (meets all)
- Lesion(s) significantly improved
- Abscess drained if present
- Tolerating PO
- Pain controlled
- Follow-up assured within 48 hours

Discharge Instructions
- Prescribe antibiotics for 5-14 days total depending on severity/response, including days completed; duration may be changed by PCP at follow-up
- PCP follow-up within 48 hours
- If recurrent abscesses, consider household decolonization (PE844)
- For MRSA, provide handouts
  - Living with MRSA
  - MRSA at Children’s (PE485)
  - Managing Your Child’s MRSA (PE844)

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### Tetanus prophyaxis in routine wound management

(Adapted from the Red Book: 2018 report of the Committee on Infectious Diseases, p. 796)

<table>
<thead>
<tr>
<th>History of tetanus toxoid (doses)</th>
<th>Clean, minor wounds</th>
<th>All other wounds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DTaP, Tdap, or Td</td>
<td>TIG</td>
</tr>
<tr>
<td>Fewer than 3 or unknown</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3 or more</td>
<td>No - if &lt; 10 years since last tetanus- containing vaccine dose.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Yes if &gt; 10 years since last tetanus- containing vaccine dose</td>
<td>No</td>
</tr>
</tbody>
</table>

TIG = Tetanus immune globulin. Immune globulin IV should be used if TIG not available.

**Other wounds** = Such as, but not limited to, wounds contaminated with dirt, feces, soil, and saliva; puncture wounds; avulsions; and wounds resulting from missiles, crushing, burns, and frostbite

**Note:** DTaP is used for children <7 years of age. Tdap is preferred to Td for underimmunized children 7 years of age or older who have not received Tdap previously.
## Antibiotic Table

Oral antibiotics are preferred. TMP-SMX, clindamycin, and amox-clav all have comparable bio-availability to IV.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Non-Purulent Cellulitis</th>
<th>Purulent SSTI / Abscess</th>
<th>Bite Wound</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PO Choice</strong></td>
<td>Cefalexin</td>
<td>TMP-SMX or clindamycin if antibiotics are elected by <a href="#">Shared Decision Making</a></td>
<td>Amoxicillin/clavulanate</td>
</tr>
<tr>
<td></td>
<td>Consider TMP-SMX or clindamycin if MRSA history</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PO Alternatives</strong></td>
<td>Clindamycin if cephalexin allergic (see <a href="#">Beta-Lactam Antibiotic Allergy Reference</a>)</td>
<td>Call ID</td>
<td>Reference Red Book</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IV Choice</strong></td>
<td>Cefazolin</td>
<td>TMP-SMX or clindamycin</td>
<td>Amoxicillin/sublactam</td>
</tr>
<tr>
<td></td>
<td>Consider TMP-SMX or clindamycin if MRSA history</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IV Alternatives</strong></td>
<td>Clindamycin if cefazolin allergic (see <a href="#">Beta-Lactam Antibiotic Allergy Reference</a>)</td>
<td>Consider vancomycin if SIRS, rapid progression, suspected clindamycin resistance, and no concern for necrotizing fasciitis</td>
<td>Reference Red Book</td>
</tr>
<tr>
<td></td>
<td>Consider vancomycin if SIRS, rapid progression, suspected clindamycin resistance, and no concern for necrotizing fasciitis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Shared Decision Making for Antibiotics after Drainage

Antibiotics provide a modest reduction in the risk of treatment failure, recurrence, additional surgical procedures and hospitalization, and reduce pain during treatment.

Antibiotics increase the risk of resistance and gastrointestinal side effects, such as nausea (TMP-SMX) and diarrhea (clindamycin). The decision whether or not to use antibiotics should take into account clinical factors (age, size, severity, systemic symptoms, recurrences) and individual values and preferences (reasons to avoid diarrhea, medication allergies, preferences about antibiotic use).

Example Tool

https://www.bmj.com/content/360/bmj.k243

Shared Decision Making

Comparison 1

No antibiotics
Incision and drainage alone

OR

Antibiotics
Incision and drainage plus trimethoprim and sulfamethoxazole or clindamycin

Applies to
All

Strong
Weak
Weak
Strong

We suggest TMP-SMX or clindamycin plus incision and drainage rather than incision and drainage alone. Discuss both options with each patient.

Comparison of benefits and harms

<table>
<thead>
<tr>
<th>Outcomes (1 month)</th>
<th>Favour no antibiotics</th>
<th>No important difference</th>
<th>Favour antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment failure</td>
<td>90</td>
<td>47 fewer</td>
<td>43</td>
</tr>
<tr>
<td>Recurrence</td>
<td>129</td>
<td>63 fewer</td>
<td>66</td>
</tr>
<tr>
<td>Invasive infections</td>
<td>4</td>
<td>No important difference</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcomes (3-4 days)</th>
<th>Favour no antibiotics</th>
<th>No important difference</th>
<th>Favour antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain (tenderness)</td>
<td>559</td>
<td>68 fewer</td>
<td>491</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Side effects (TMP-SMX)</th>
<th>Favour no antibiotics</th>
<th>No important difference</th>
<th>Favour antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrointestinal side effects</td>
<td>55</td>
<td>21 fewer</td>
<td>106</td>
</tr>
<tr>
<td>Nausea</td>
<td>24</td>
<td>11 fewer</td>
<td>35</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>67</td>
<td>No important difference</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Side effects (clindamycin)</th>
<th>Favour no antibiotics</th>
<th>No important difference</th>
<th>Favour antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrointestinal side effects</td>
<td>90</td>
<td>93 fewer</td>
<td>185</td>
</tr>
<tr>
<td>Nausea</td>
<td>24</td>
<td>No important difference</td>
<td></td>
</tr>
<tr>
<td>Diarrhea</td>
<td>67</td>
<td>96 fewer</td>
<td>162</td>
</tr>
</tbody>
</table>

Preferences and values

Different people probably place different values on the expected consequences (both desirable and undesirable) of taking antibiotics. Different individuals are likely to choose different treatment options. Shared decision making is needed to elicit these values and preferences.

Antibiotic resistance

Antibiotic use increases antibiotic resistance in the community and in recurrent infections in the individual. However, the impact of a single course of antibiotics is very uncertain.
CSW Cellulitis and Abscess Pathway Approval & Citation

Approved by the CSW Cellulitis and Abscess Pathway team for September 25, 2019, go-live

CSW Cellulitis and Abscess Pathway Team:

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Please cite as:
Evidence Ratings

This pathway was developed through local consensus based on published evidence and expert opinion as part of Clinical Standard Work at Seattle Children’s. Pathway teams include representatives from Medical, Subspecialty, and/or Surgical Services, Nursing, Pharmacy, Clinical Effectiveness, and other services as appropriate.

When possible, we used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trial or cohort studies. The rating is then adjusted in the following manner (from: Guyatt G et al. J Clin Epidemiol. 2011;4:383-94, Hultcrantz M et al. J Clin Epidemiol. 2017;87:4-13.):

- Quality ratings are downgraded if studies:
  - Have serious limitations
  - Have inconsistent results
  - If evidence does not directly address clinical questions
  - If estimates are imprecise OR
  - If it is felt that there is substantial publication bias

- Quality ratings are upgraded if it is felt that:
  - The effect size is large
  - If studies are designed in a way that confounding would likely underreport the magnitude of the effect OR
  - If a dose-response gradient is evident

Certainty of Evidence:

- 🌟🌟🌟🌟 High: The authors have a lot of confidence that the true effect is similar to the estimated effect
- 🌟🌟🌟 Moderate: The authors believe that the true effect is probably close to the estimated effect
- 🌟🌟🌟 Low: The true effect might be markedly different from the estimated effect
- 🌟🌟🌟 Very low: The true effect is probably markedly different from the estimated effect

Guideline: Recommendation is from a published guideline that used methodology deemed acceptable by the team
Expert Opinion: Based on available evidence that does not meet GRADE criteria (for example, case-control studies).
Summary of Version Changes

- **Version 1.0 (8/15/2013):** Go live.
- **Version 1.1 (11/6/2013):** Clarified which patients should receive Orthopedic consultation in the ED. Recommended laboratory studies to be performed prior to Orthopedic consultation. Excluded patients with solitary dental abscess from the ED phase.
- **Version 1.2 (7/3/2018):** Clarified management for Necrotizing Soft Tissue Infections (NSTI) and emphasized importance of surgical urgency.
- **Version 2.0 (9/25/2019):** Periodic review go live. Overhauled entire document: removed all references to dental abscesses as they are not SSTI; revised suspected NSTI plan; edited special situations for consultations; removed size restriction for drainage; removed ages from admit criteria; updated medical treatment (noted preference for oral antibiotics, added TMP-SMX option, added shared decision making for antibiotic treatment after I&D, removed confusing list of alternative antibiotics, and widened total treatment duration depending on severity); edited discharge criteria; and added consideration of household decolonization.
- **Version 3.0 (1/31/2020):** Added details to Version 2.0 summary of version changes. Added link to new NSTI ED GOC 11996. Changed inpatient escalation if NSTI suspected.
Medical Disclaimer

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required.

The authors have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication.

However, in view of the possibility of human error or changes in medical sciences, neither the authors nor Seattle Children’s Healthcare System nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from the use of such information.

Readers should confirm the information contained herein with other sources and are encouraged to consult with their health care provider before making any health care decision.
Methods

For this update, we revised the search strategies in line with current Library practices. A literature search was conducted in February 2019 to target synthesized literature on skin and soft tissue infections, cellulitis and skin abscess from January 2014 to current and limited to English and humans. The search was executed in Ovid Medline, Embase, Cochrane Database of Systematic Reviews (CDSR) and Turning Research into Practice (TRIP) databases.

Two reviewers independently screened abstracts and included guidelines and systematic reviews that addressed optimal diagnosis, treatment, and prognosis of patients who meet pathway inclusion/exclusion criteria. One reviewer extracted data and a second reviewer quality checked the results. Differences were resolved by consensus.

Flow diagram adapted from Moher D et al. BMJ 2009;339:bmj.b2535
Included Studies

Barbic, D., Chenkin, J., Cho, D. D., Jelic, T., & Scheuermeyer, F. X. (2017). In patients presenting to the emergency department with skin and soft tissue infections what is the diagnostic accuracy of point-of-care ultrasonography for the diagnosis of abscess compared to the current standard of care? A systematic review and meta-analysis. BMJ Open, 7(1), e013688. doi:https://dx.doi.org/10.1136/bmjopen-2016-013688


