

Skin Infections: Cellulitis & Abscess

Executive Summary

PRIMARY OBJECTIVE

To improve the quality and safety of care for uncomplicated skin infections in children across the continuum.

CLINICAL CARE GUIDELINES

Intended for patients:

- 3 months and greater
- With skin and soft tissue infections (i.e. cellulitis, folliculitis, erysipelas, abscess, etc.)

Not intended for patients with:

- Foreign body suspected
- Immunocompromised
- Infection near a recent surgical site
- Facial infection including orbital, periorbital, or dental
- Bite wounds
- Symptoms overlying a joint - consider [MSK Pathway](#)
- Adenitis

CLINICAL MANAGEMENT

These clinical management guidelines are based on current pediatric evidence as noted in the literature review below and local microbiology. The steering committee will update these guidelines continually based on epidemiological and clinical trials data, as well as local quality improvement data from key stakeholders.

Non-Toxic Patients

- Suppurative patients with fluctuance/drainage; abscess suspected
 - o Most likely cause is methicillin-resistant *Staphylococcus aureus* (MRSA)
 - o Incision and drainage with culture (See appendix A)
 - o Clindamycin 40 mg/kg/day divided every 8 hours (IV) or TID (PO), when culture results return, narrow or change antimicrobial therapy as needed. Clindamycin has very low clinical failure rates in our region and superior tissue penetration when compared with trimethoprim-sulfamethoxazole (Bactrim). Bactrim may be considered as an alternative, particularly in patients allergic to or otherwise unable to tolerate Clindamycin. Trimethoprim-sulfamethoxazole 8-12 mg TMP/kg/day divided BID (based on TMP component) PO BID. If no improvement in 48-72 hours on Bactrim, then transition to Clindamycin.
 - o Routine ultrasound or laboratory testing is not currently recommended. While some studies have shown a greater sensitivity and specificity of ultrasound over physical exam for distinguishing an abscess versus cellulitis alone, others have noted that it has poor predictive value and can vary depending on the individual ultrasound operator. As the data in children is limited and studies have not shown a significant change in management of most patients based on ultrasound results, at this point it is not routinely recommended. Similarly, there is no data demonstrating an added benefit to routine laboratory testing of non-toxic patients with skin and soft tissue infections.
 - o There is limited data suggesting that some patients may be treated with incision and drainage alone, without further antibiotic treatment. However, this data is limited in pediatrics at this time.
- Non-suppurative patients, with cellulitis but no evidence of abscess, indurated but no fluctuance/drainage
 - o Most likely causes include Group A streptococcus (*Streptococcus pyogenes*) and *Staphylococcus aureus* (MSSA or MRSA)
 - o Assess for personal or family history of MRSA. If positive history, treat with Clindamycin 40 mg/kg/day divided every 8 hours. If negative history, treat with Cefazolin 100 mg/kg/day every 6-8 hours or Cephalexin 50 mg/kg/day TID. If patient with Cephalosporin allergy, treat with Clindamycin. Tri-

Skin Infections: Cellulitis & Abscess

Executive Summary

methoprim-

sulfamethoxazole (Bactrim) would not be recommended in this setting given the high rates of Group A streptococcal resistance to trimethoprim-sulfamethoxazole.

- o Routine laboratory testing is not currently recommended. There is no data demonstrating an added benefit to routine laboratory testing of non-toxic patients with skin and soft tissue infections.
- Schedule follow-up with PCP in 1-2 days after discharge. Typical course of antibiotics is 7-10 days, but may vary by patient. If patient has not improved in 48-72 hours consider further evaluation (CBC, CRP, blood culture, and/or ultrasound), alternative therapy, or consultation with Infectious Disease at (402) 955-4005.

Admission Criteria: Consider Admission in Patients with the Following:

- Failure of outpatient therapy
- Poor accessibility to care
- Extensive involvement (hands, feet, face, groin, overlying joints)
- Not tolerating PO
- Rapid progression
- Inadequate pain control

Toxic Patients (Febrile and Increased Heart Rate or Decreased Blood Pressure)

- Labs: CBC, blood culture, Chem 8, CRP
- Suppurative patients with fluctuant/draining; abscess suspected
 - o Most likely cause is methicillin-resistant Staphylococcus aureus (MRSA)
 - o Incision and drainage with culture, do not wait to start antibiotics (See appendix A)
 - o Treat with Vancomycin 60 mg/kg/day divided every 6 hours.
- Non-suppurative patients with cellulitis but no evidence of abscess, indurated but not fluctuant/draining
 - o Most likely causes include Group A streptococcus (Streptococcus pyogenes) and Staphylococcus aureus (MSSA or MRSA)
 - o Assess for personal or family history of MRSA. If positive history, treat with Vancomycin 60 mg/kg/day divided every 6 hours. If negative history, treat with Cefazolin 100 mg/kg/day divided every 8 hours. In severely ill patients, consider both cefazolin and vancomycin. There is currently no evidence to support the routine use of dual therapy in toxic-appearing patients with skin and soft tissue infection; however, in severely ill patients, the addition of a rapidly bactericidal beta-lactam antibiotic may be indicated.
 - o For both suppurative and non-suppurative patients may consider addition of Clindamycin 40 mg/kg/day divided every 8 hours if toxin mediated process is suspected. When culture results return, narrow or change antimicrobial therapy as needed.
- Admit patient.
- Consults to consider:
 - o Infectious Disease – highly recommended in patients with positive blood cultures.
 - o Pediatric Surgery – will help to determine the need for ultrasound and more extensive debridement.
- Consider de-escalation of therapy when:
 - o Fever and cardiovascular instability is resolved
 - o Physical exam is improving
 - o Tolerating PO fluids and medication

RATIONALE

- **Safety:** Will be maintained by close communication and consistency between ED, Hospitalists, and ID providers.
- **Quality:** Will be improved by reducing unnecessary variation related to diagnostic testing, antimicrobial utilization, and specialist involvement.
- **Cost:** Will be reduced by decreasing variation in treatment which leads to potential delays, adverse events, and readmissions.
- **Engagement:** Is created and supported by involvement of providers across the continuum of care that evaluate and treat skin and soft tissue infections.
- **Patient/Family Satisfaction:** Shall be improved by providing the highest quality care based on established guidelines and the

Skin Infections: Cellulitis & Abscess

Executive Summary

latest evidence available in the literature.

METRICS PLAN

- Monitor the type of antibiotic and duration of therapy for treatment of cellulitis to assess for variability in practice (ED and Inpatient).
- Monitor the frequency of ultrasounds, CBC, CRP, and blood cultures are ordered for non-toxic appearing patients (ED and Inpatient).
- Monitor the cost per case based on the average number of hospital days.

SUPPORTING DOCUMENTS (PATHWAY, INCLUSION/EXCLUSION CRITERIA, DEFINITIONS, ALGORITHM)

- Skin Infections: Cellulitis & Abscess (Non-Toxic Patient) Algorithm
- Skin Infections: Cellulitis & Abscess (Toxic Patient) Algorithm
- CP Cellulitis/Abscess Smartset

TEAM MEMBERS

Jessica Wollberg APRN (Children's Physicians), Dr. Jessica Snowden (Infectious Disease), Dr. Lauren Maskin (Hospitalist), Dr. Jennifer Wang (Emergency), Melisa Paradis RN (Quality & Patient Safety)

EVIDENCE

1. Duong, M., Markwell, S., Peter, J., Barenkamp, S. Randomized, controlled trial of antibiotics in the management of community-acquired skin abscesses in the pediatric patient. *Annals of Emergency Medicine*. 2010;55(5):401-407.
2. Elliott, D.J., Zaoutis, T.E., Troxel, A.B., et al. Empiric antimicrobial therapy for pediatric skin and soft-tissue infections in the era of methicillin-resistant *Staphylococcus aureus*. *Pediatrics*. 2009;123(6):e959-966.
3. Gaspari RJ, Blehar D, Polan D, et al. The Massachusetts abscess rule: A clinical decision rule using ultrasound to identify Methicillin-resistant *Staphylococcus aureus* in skin abscesses. *Academic Emergency Medicine*. 2014;21(5):558-567.
4. Iverson, K., Haritos, D., Thomas, R., Kannikeswaran, N. The effect of bedside ultrasound on diagnosis and management of soft tissue infections in a pediatric ED. *American Journal of Emergency Medicine*. 2012; 30:1347–1351.
5. Jeng A, Beheshti M, Li J, Nathan R. The role of \square -Hemolytic streptococci in causing diffuse, nonculturable cellulitis. *Medicine*. 2010;89(4):217-226.
6. Miller LG, Daum RS, Creech CB, et al. Clindamycin versus Trimethoprim-Sulfamethoxazole for uncomplicated skin infections. *New England Journal of Medicine*. 2015;372(12):1093-1103.
7. Mistry RD, Marin JR, Alpern ER. Abscess volume and ultrasound characteristics of community-associated methicillin-resistant *Staphylococcus aureus* infection. *Pediatric Emergency Care*. 2013;29(2):140-144.
8. Rajendran PM, Young D, Maurer T, et al. Randomized, double-blind, placebo-controlled trial of cephalexin for treatment of uncomplicated skin abscesses in a population at risk for community-acquired methicillin-resistant *Staphylococcus aureus* infection. *Antimicrobial Agents and Chemotherapy*. 2007;51(11):4044-4048.
9. Schmitz, G.R., Bruner, D., Pitotti, R., et al. Randomized controlled trial of trimethoprim-sulfamethoxazole for uncomplicated skin abscesses in patients at risk for community-associated methicillin-resistant *Staphylococcus aureus* infection. *Annals of Emergency Medicine*. 2010;56(3):283-287.
10. Seattle Children's Cellulitis and Abscess Pathway, Revised August 15, 2013.
11. Squire BT, Fox JC, Anderson C. ABSCCESS: Applied bedside sonography for convenient evaluation of superficial soft tissue infections. *Academic Emergency Medicine*. 2005; 12(7):601-606.
12. Stevens, D.L., Bisno, A.L., Chambers, H.F., Patchen Dellinger, E., et al. Practice guidelines for the diagnosis and management of skin and soft tissue infection: 2014 update by the Infectious Diseases Society of America. *Clinical Infectious Disease*. 2014; 59(2):e10-52.
13. Tayal VS, Hasan N, Norton J, et al. The effect of soft-tissue ultrasound on the management of cellulitis in the emergency department. 2006;13(4):384-388.

APPENDIX A

Incision and Drainage Recommendations

Once fluctuance/drainage is identified supporting presence of an abscess, an incision and drainage procedure is recommended. Drainage by a Pediatric Surgeon should be considered when there is a large, complex abscess, it involves a sensitive area such as labia, perineum, or there is a history of a previous abscesses. There is a portable ultrasound machine in the Emergency Department which can be used in cases where an abscess is in question.

Anesthesia/Sedation

Local anesthesia is recommended before draining the area. EMLA can be used on areas that are closed and will often drain the abscess itself. TLE can be used on open wounds. Both take time to work (40-60 minutes) effectively. The full recommended time for the local anesthetic product should be followed. For smaller areas, the cold spray (Pain Ease) is effective. Local infiltration with lidocaine is less effective than in other situations as infected tissues do not have the same uptake as healthy tissue. Some patients will need actual anxiolysis which can be accomplished using intranasal versed. For more complex cases, IV versed with consideration of Ketamine sedation or general anesthesia for the most severe abscesses.

Procedure

The area should be prepped and cleaned, but it is not a sterile procedure. After anxiolysis or sedation is achieved, clean the area. Pending the size, some patients will need simple unroofing which could be done with a large bore needle, scalpel for larger abscesses and may use a syringe to drain the pocket of the infection. A sample of the drainage should be collected for culture and the rest of the abscess should be expressed. In loculated abscesses, a hemostat may be required to break up the collection to drain it fully.

Packing/Bandaging

Irrigate the abscess area and if the cavity is deep/large enough, packing will be necessary for optimum healing. It is also suggested to draw a line around the borders of erythema for tracking the improvement or worsening of the infection. This is especially helpful if drainage happens in one setting and follow up will be in another setting with a different provider. Keeping the wound clean is essential to healing and parents should be advised to change soiled dressings.